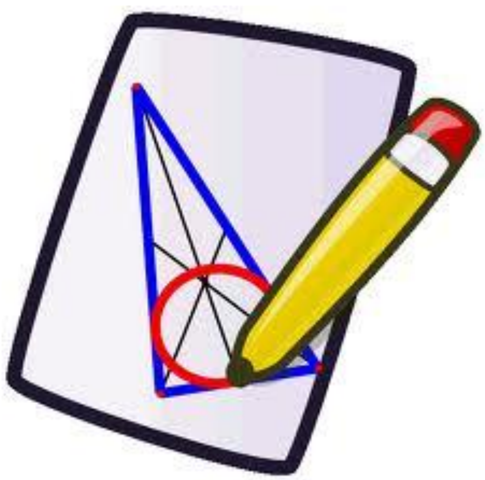
Geometry Beginning Proofs Packet 1



Name: ___________________________________

Teacher: _________________________________

Table of Contents

Day 1 – Algebraic Proofs

Warm - Up

The solution to an algebraic equation is a type of proof. The steps must appear in the correct order, and you must be able to justify each step.

1. Write a step-by-step solution of the linear equation by placing the given equations in the correct order.

$$3x - 12 + 5 = 17$$

$$3x = 24$$

$$3x - 7 = 17$$

$$3(x - 4) + 5 = 17$$

$$x = 8$$

a. ____________________
↓
b. ____________________
↓
c. ____________________
↓
d. ____________________
↓
e. ____________________

2. What property do you use to go from step **a** to step **b**?

3. What do you do to the equation to go from step **c** to step **d**?

4. What do you do to the equation to go from step **d** to step **e**?

A **proof** is an argument that uses logic, definitions, properties, and previously proven statements to show that a conclusion is true.

An important part of writing a proof is giving justifications to show that every step is valid.

Properties of Equality

Addition Property of Equality	If $a = b$, then $a + c = b + c$.
Subtraction Property of Equality	If $a = b$, then $a - c = b - c$.
Multiplication Property of Equality	If $a = b$, then $ac = bc$.
Division Property of Equality	If $a = b$ and $c \neq 0$, then $\frac{a}{c} = \frac{b}{c}$.
Reflexive Property of Equality	$a = a$
Symmetric Property of Equality	If $a = b$, then $b = a$.
Transitive Property of Equality	If $a = b$ and $b = c$, then $a = c$.
Substitution Property of Equality	If $a = b$, then b can be substituted for a in any expression.

Example 1:

Given: $4m - 8 = -12$
Prove: $m = -1$

Statements	Reasons

Example 2:

Given: $8x - 5 = 2x + 1$
Prove: $1 = x$

Statements	Reasons

You Try It!

Given: $4x + 8 = x + 2$
Prove: $x = -2$

Statements	Reasons

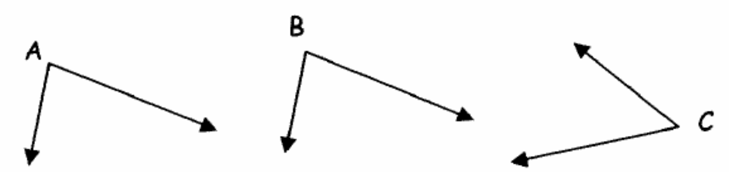
You learned in Chapter 1 that segments with equal lengths are congruent and that angles with equal measures are congruent. So the Reflexive, Symmetric, and Transitive Properties of Equality have corresponding properties of congruence.

Properties of Congruence

SYMBOLS	EXAMPLE
Reflexive Property of Congruence figure *A* ≅ figure *A* (Reflex. Prop. of ≅)	$\overline{EF} \cong \overline{EF}$
Symmetric Property of Congruence If figure *A* ≅ figure *B*, then figure *B* ≅ figure *A*. (Sym. Prop. of ≅)	If $\angle 1 \cong \angle 2$, then $\angle 2 \cong \angle 1$.
Transitive Property of Congruence If figure *A* ≅ figure *B* and figure *B* ≅ figure *C*, then figure *A* ≅ figure *C*. (Trans. Prop. of ≅)	If $\overline{PQ} \cong \overline{RS}$ and $\overline{RS} \cong \overline{TU}$, then $\overline{PQ} \cong \overline{TU}$.

Given: $\angle A \cong \angle B$

$\angle A \cong \angle C$

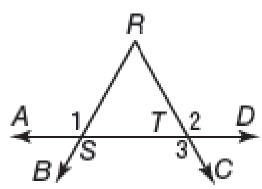


Concl: ______________

Example 3

Given: $m\angle 1 = m\angle 2,\ m\angle 2 = m\angle 3$

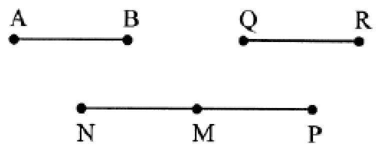
Prove: $m\angle 1 = m\angle 3$



Statements	Reasons
1	1
2	2
3	3

You Try It!

Given: $\overline{AB} \cong \overline{NM}$
$\overline{QR} \cong \overline{MP}$
$\overline{NM} \cong \overline{MP}$

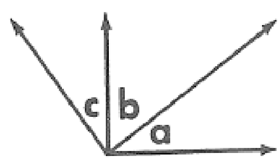


Statements	Reasons
1	1
2	2
3	3
4	4

Example 4:

Given: $m\angle a + m\angle b = 90.$
$m\angle a = m\angle c.$

Prove: $m\angle c + m\angle b = 90.$

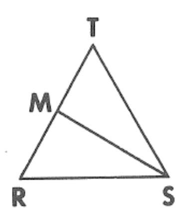


Statements	Reasons
1	1
2	2
3	3

You Try It!

Given:
$MT = \frac{1}{2} RT.$
$RM = MT.$

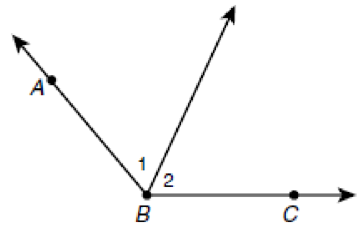
Prove:
$RM = \frac{1}{2} RT.$

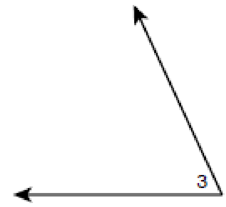


Statements	Reasons
1	1
2	2
3	3

Challenge

In the figure, $\angle 1 \cong \angle 3$, $\angle 3 \cong \angle 2$, and $m\angle 1 = 65°$.
Find $m\angle ABC$. Justify each step.





SUMMARY

Properties of Equality

Addition Property of Equality	If $a = b$, then $a + c = b + c$.
Subtraction Property of Equality	If $a = b$, then $a - c = b - c$.
Multiplication Property of Equality	If $a = b$, then $ac = bc$.
Division Property of Equality	If $a = b$ and $c \neq 0$, then $\frac{a}{c} = \frac{b}{c}$.
Reflexive Property of Equality	$a = a$
Symmetric Property of Equality	If $a = b$, then $b = a$.
Transitive Property of Equality	If $a = b$ and $b = c$, then $a = c$.
Substitution Property of Equality	If $a = b$, then b can be substituted for a in any expression.

Exit Ticket

1. Choose the property that justifies the following statement.
   If $x = 2$ and $x + y = 3$, then $2 + y = 3$.
   A Reflexive **B** Symmetric **C** Transitive **D** Substitution

2. Choose the property that justifies the statement $m\angle A = m\angle A$.
   F Reflexive **G** Symmetric **H** Transitive **J** Substitution

3. Choose the property that justifies the statement *If* $\overline{GH} \cong \overline{FD}$, *then* $\overline{FD} \cong \overline{GH}$.
   A Reflexive
   B Symmetric
   C Transitive
   D Definition of congruent segments

Homework

State the property that justifies each statement.

1. If $m\angle 1 = m\angle 2$, then $m\angle 2 = m\angle 1$.

2. If $m\angle 1 = 90$ and $m\angle 2 = m\angle 1$, then $m\angle 2 = 90$.

3. If $AB = RS$ and $RS = WY$, then $AB = WY$.

4. If $AB = CD$, then $\frac{1}{2}AB = \frac{1}{2}CD$.

5. If $m\angle 1 + m\angle 2 = 110$ and $m\angle 2 = m\angle 3$, then $m\angle 1 + m\angle 3 = 110$.

6. $RS = RS$

7. If $AB = RS$ and $TU = WY$, then $AB + TU = RS + WY$.

8. If $m\angle 1 = m\angle 2$ and $m\angle 2 = m\angle 3$, then $m\angle 1 = m\angle 3$.

Proofs

9. Given: 2(a + 1) = -6
Prove: a = -4

Statements	Reasons

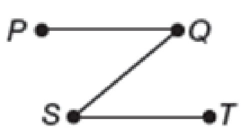
10. Given: 5 + x = 6x
Prove: a = 1

Statements	Reasons

11. Given: $\overline{PQ} \cong \overline{QS}$

$\overline{QS} \cong \overline{ST}$

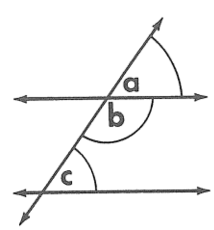
Prove: $\overline{PQ} \cong \overline{ST}$



Statements	Reasons

12. *Given:*
$m\angle a + m\angle b = 180$.
$m\angle a = m\angle c$.

Prove:
$m\angle c + m\angle b = 180$.

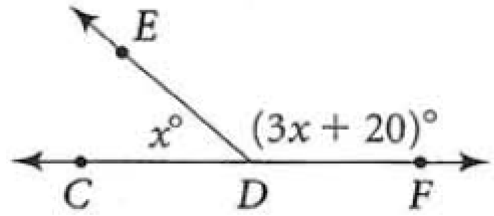


Statements	Reasons

Proofs Involving the Addition and Subtraction Postulate – Day 2

Warm – Up

Fill in the reason that justifies each step.



Solve for x.

$m\angle CDE + m\angle EDF = 180$	**a.** ?
$x + (3x + 20) = 180$	**b.** ?
$4x + 20 = 180$	**c.** ?
$4x = 160$	**d.** ?
$x = 40$	**e.** ?

Use the property to complete the statement.

2. Reflexive Property: ________ $= SE$
3. Symmetric Property: If ________ = ________ , then $m\angle RST = m\angle JKL$
4. Transitive Property: If $m\angle F = m\angle J$ and ________ $\cong$ ________ , then $m\angle F = m\angle L$.

The Addition Postulate

If equal quantities are added to equal quantities, the sums are equal.

If $a = b$, and $c = d$, then $a + c = b + d$.

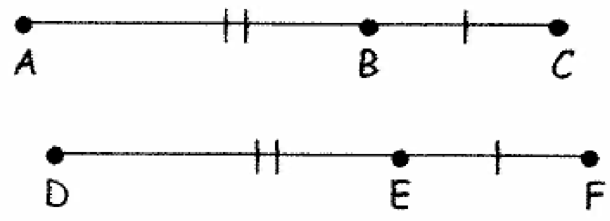
OR

If congruent quantities are added to congruent quantities, the sums are equal.

Addition of Segments

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

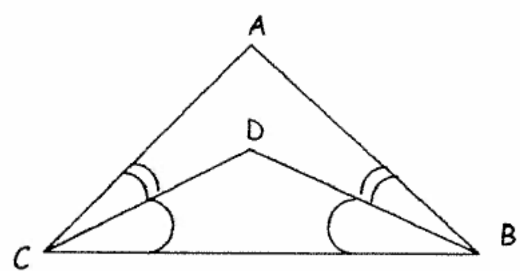
Concl:____________________



Addition of Angles

Given: $\angle ACD \cong \angle ABD, \angle DCB \cong \angle DBC$

Concl: ____________________



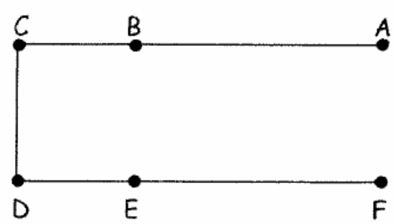
Writing Proofs

Strategy: Look for a GAP. Fill in the gap by ADDITION.

Example 1

Given: $\overline{AB} \cong \overline{FE}, \overline{BC} \cong \overline{ED}$

Prove: $\overline{AC} \cong \overline{FD}$

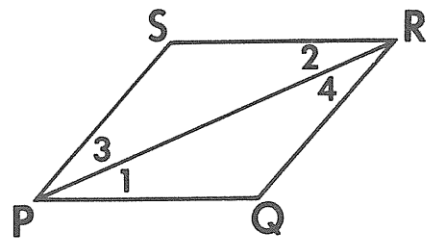


Statements	Reasons
1	1
2	2
3	3

Example 2

Given:
$m\angle 1 = m\angle 2.$
$m\angle 3 = m\angle 4.$

Prove:
$m\angle QPS = m\angle QRS.$

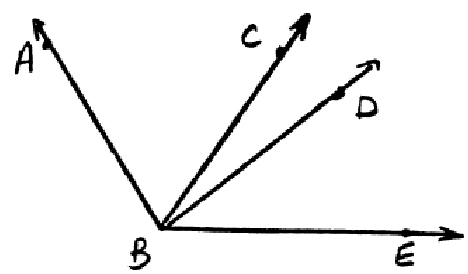


Statements	Reasons
1	1
2	2
3	3

Example 3:

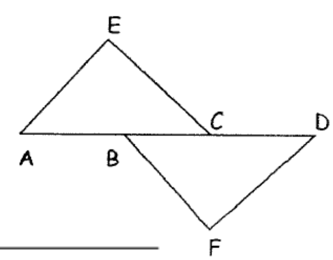
Given: $\overline{MN} \cong \overline{OP}$
Conclusion:__________________

Example 4:



Given: $\angle ABC \cong \angle DBE$
Conclusion:__________________

Example 5:
Given: $\overline{AB} \cong \overline{CD}$
Prove: $\overline{AC} \cong \overline{DB}$

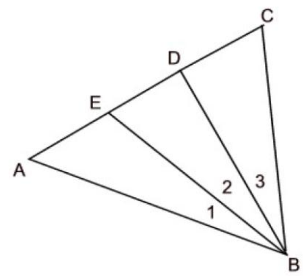


Statements	Reasons
1	1
2	2
3	3

Example 6:

Given: $\measuredangle 1 \cong \measuredangle 3$

Prove: $\measuredangle ABD \cong \measuredangle EBC$



Statements	Reasons
1	1
2	2
3	3

The Subtraction Postulate

If a segment (or angle) is subtracted from $\cong$ segments (or angle), then the differences are $\cong$.

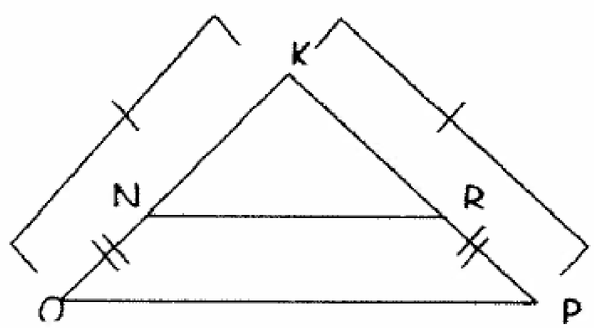
If $a = b$, and $c = d$, then $a - c = b - d$.

Subtraction of Segments

Example 7:

Given: $\overline{KO} \cong \overline{KP}$, $\overline{NO} \cong \overline{RP}$

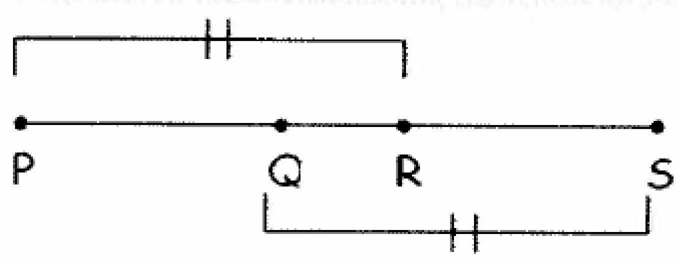
Concl:________________



Example 8:

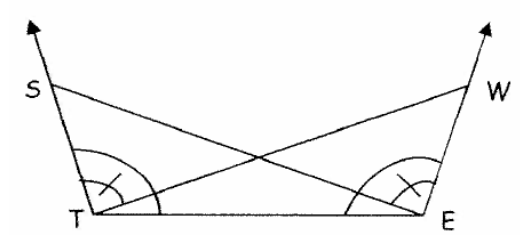
Given: $\overline{PR} \cong \overline{QS}$

Concl:________________



Subtraction of Angles

Example 9:



Given: $\angle STE \cong \angle WET, \angle STW \cong \angle WES$

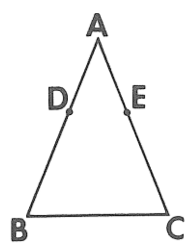
Concl:________________________

Writing Proofs

Strategy: Look for an OVERLAP. SUBTRACT to get rid of the overlap.

Example 10: *Given:* $\overline{AB} \cong \overline{AC}$. $\overline{DB} \cong \overline{EC}$.

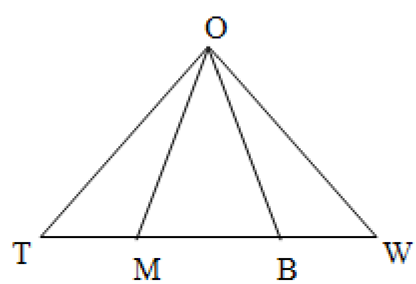
Prove: $\overline{AD} \cong \overline{AE}$.



Statements	Reasons
1	1
2	2
3	3

Example 11: Given: $\measuredangle TOB \cong \measuredangle WOM$

Prove: $\measuredangle TOM \cong \measuredangle WOB$



Statements	Reasons
1	1
2	2
3	3

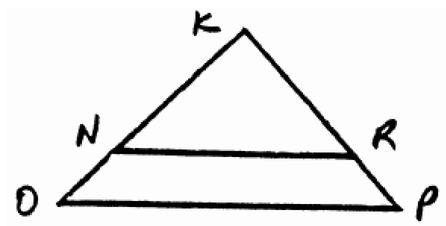
SUMMARY

Strategy: If you are given smaller segments or angles and are trying to get larger segments or angles, think ADDITION.
If you are given larger segments or angles and are trying to get smaller segments or angles, think SUBRTRACTION.

Strategy: Look for a GAP. Fill in the gap by ADDITION.

Strategy: Look for an OVERLAP. SUBTRACT to get rid of the overlap.

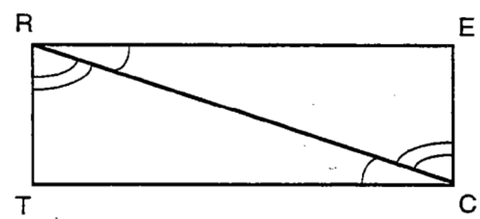
1. Given: $\overline{OK} \cong \overline{PK}$
$\overline{ON} \cong \overline{PR}$
Conclusion:



REASON:

2. Given: Diagram as shown.

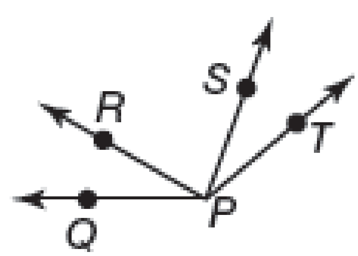
Concl:______________



REASON:

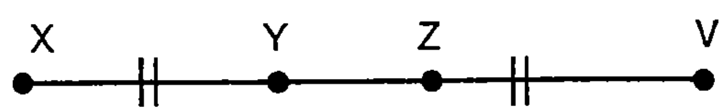
3. **Given:** $\angle QPS \cong \angle TPR$

Concl:________________



REASON:

4. Given: Diagram as shown.

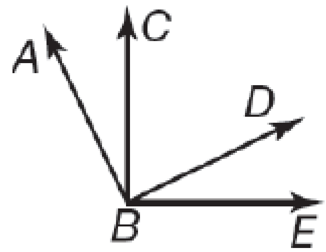


Concl:______________

REASON:

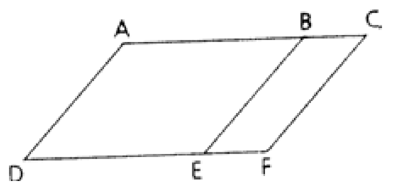
Day 2 - Homework

1 Given: $\measuredangle ABC \cong \measuredangle EBD$
Prove: $\measuredangle ABD \cong \measuredangle EBC$



Statements	Reasons
1	1
2	2
3	3

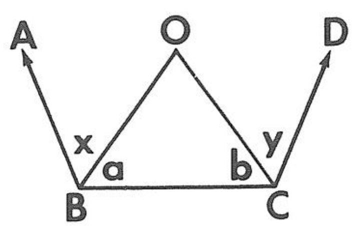
2. Given: $\overline{AC} \cong \overline{DF}$,
$\overline{BC} \cong \overline{EF}$
Prove: $\overline{AB} \cong \overline{DE}$



Statements	Reasons
1	1
2	2
3	3

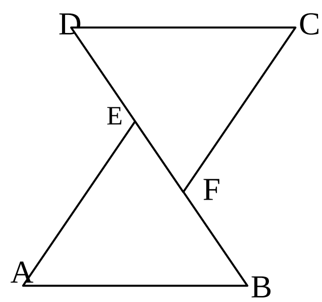
3. *Given:*
$m\angle ABC = m\angle DCB$.
$m\angle a = m\angle b$.

Prove:
$m\angle x = m\angle y$.



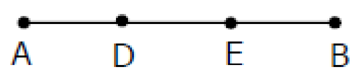
Statements	Reasons
1	1
2	2
3	3

4. Given: $\overline{DF} \cong \overline{BE}$
Prove: $\overline{ED} \cong \overline{BF}$



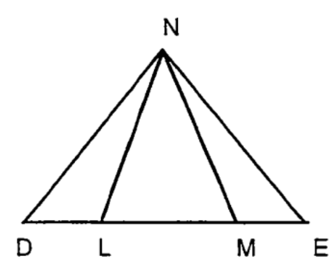
Statements	Reasons
1	1
2	2
3	3

5. Given: $AD = BE$
Prove: $AE = BD$



Statements	Reasons
1	1
2	2
3	3

6. Given: $\angle DNM \cong \angle ENL$
Prove: $\measuredangle DNL \cong \measuredangle ENM$

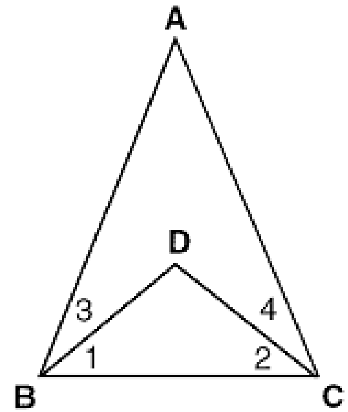


Statements	Reasons
1	1
2	2
3	3

Definition Proofs – Day 3

Warm – Up:

Supply the missing reason(s) for the given proof.



Statement	Reason
(1) $m\angle ABC = m\angle ACB$ $m\angle 3 = m\angle 4$	(1) Given
(2) $m\angle 1 = m\angle 2$	(2)

Geometric Proofs Process

Key Concept — The Proof Process

For Your FOLDABLE

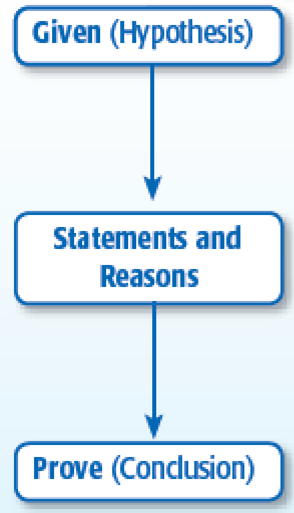
Step 1 List the given information and, if possible, draw a diagram to illustrate this information.

Step 2 State the theorem or conjecture to be proven.

Step 3 Create a **deductive argument** by forming a logical chain of statements linking the given to what you are trying to prove.

Step 4 Justify each statement with a reason. Reasons include definitions, algebraic properties, postulates, and theorems.

Step 5 State what it is that you have proven.



Midpoint Theorem

conditional: if a point is a midpoint, then

converse: if a point divides a segments into 2 ≅ segments, then

Steps 1 and 2 →

Given: M is the midpoint of $\overline{XY}$.

Prove: $\overline{XM} \cong \overline{MY}$

Steps 3 and 4 →

If M is the midpoint of $\overline{XY}$, then from the definition of midpoint of a segment, we know that $XM = MY$. This means that $\overline{XM}$ and $\overline{MY}$ have the same measure. By the definition of congruence, if two segments have the same measure, then they are congruent.

Step 5 →

Thus, $\overline{XM} \cong \overline{MY}$.

Example 1:

Given: M is the midpoint of $\overline{CD}$.

Conclusion: ______________________________

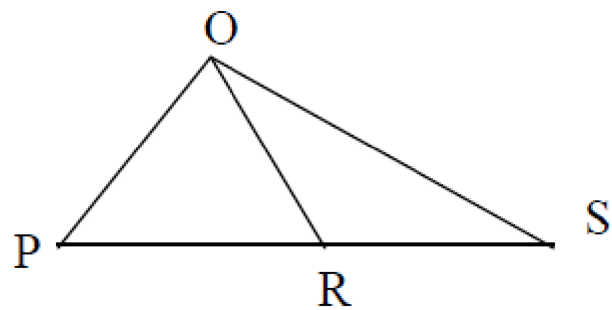
Reason: ________________________________

Writing Proofs

Example 2:

Given: R is the midpoint of $\overline{PS}$

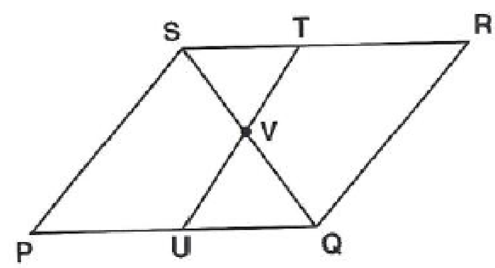
Prove: $\overline{PR} \cong \overline{SR}$



Statements	Reasons
1	1 **Given**
2 _____ ≅ _____	2

Example 3: **Given: V is the midpoint of $\overline{SQ}$**

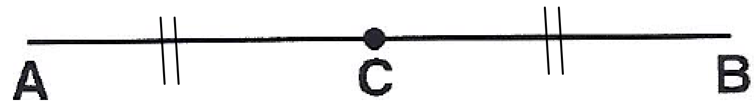
Prove: $\overline{SV} \cong \overline{QV}$



Statements	Reasons
1	1 **Given**
2 _____ ≅ _____	2

Example 4:

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

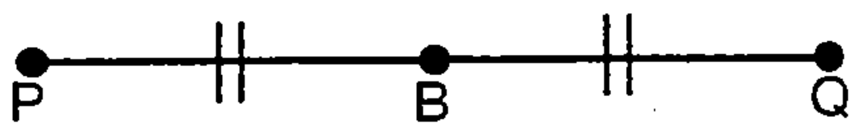


Conclusion: ____________________________

Statements	Reasons
1	1
2	2

You Try It!

Given: $\overline{PB} \cong \overline{QB}$



Conclusion: ________________________________

Statements	Reasons
1	1
2	2

BISECTOR THEOREMS

<u>Segment Bisector</u>

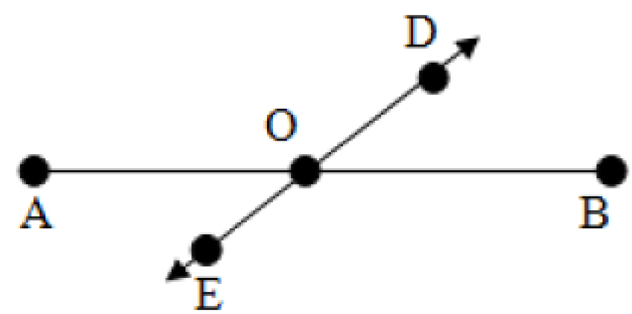
Conditional: If a segment, ray or line bisects a segment, then it intersects the segment at its midpoint, thus creating two ______ segments.

Converse: If a segment is divided into two congruent segments, then the line, ray, or segment that intersects that segment at its midpoint is a segment __________.

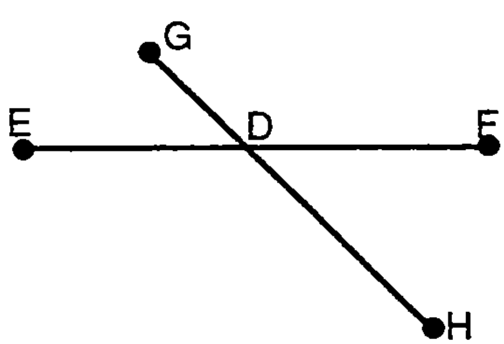
Given: $\overleftrightarrow{DE}$ bisects $\overline{AB}$

Conclusion: ______________________________

Reason: ______________________________



Given: $\overline{GH}$ bisects $\overline{EF}$.



Conclusion: ______________________________

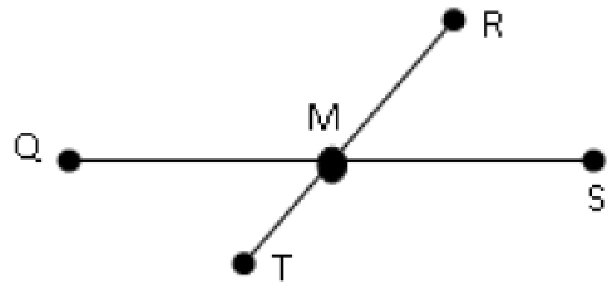
Reason: ______________________________

Writing Proofs

Example 5:

Given: $\overline{RT}$ bisects $\overline{QS}$ at M.

Prove: $\overline{QM} \cong \overline{MS}$

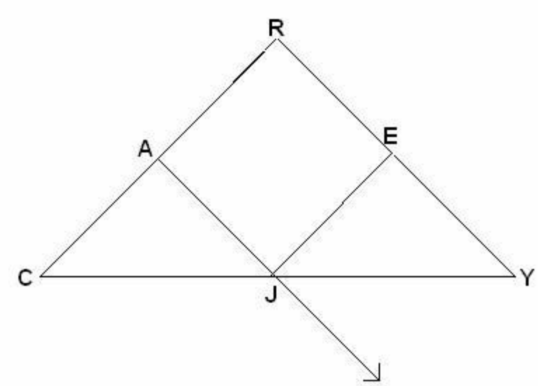


Statements	Reasons
1	1 **Given**
2 ____ ≅ ____	2

Example 6:

Given: $\overrightarrow{AJ}$ $bisects$ $\overline{CY}$

Prove: $\overline{CJ} \cong \overline{YJ}$



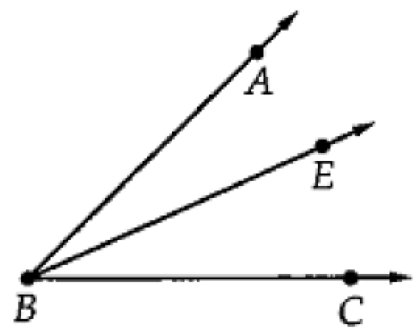
Statements	Reasons
1	1 **Given**
2 ____ ≅ ____	2

Angle Bisector

conditional: if a ray bisects an $\angle$, then ______________________________

converse: if a ray divides an $\angle$ into 2 $\cong$ $\angle$s, then ____________________

Example 7

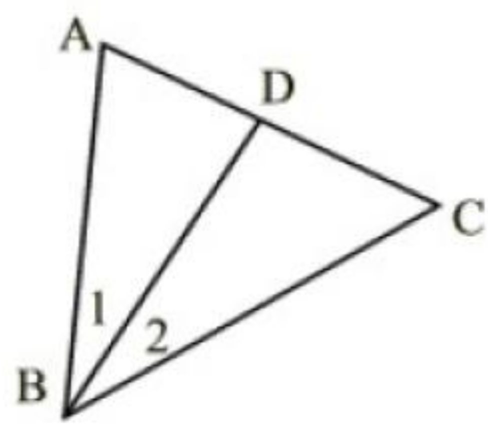


Given: $\overrightarrow{BE}$ bisects $\angle$ABC

Conclusion: ______________________________

Reason: ________________________________

Example 8:



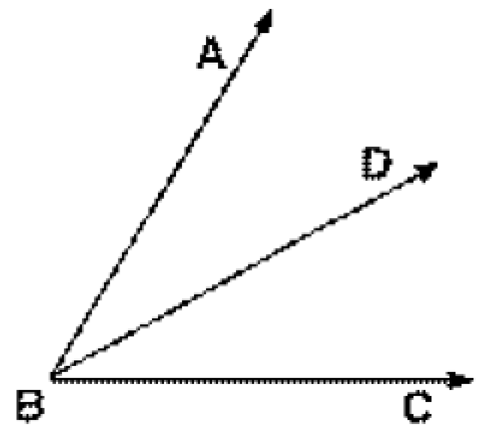
Given: $\overline{BD}$ bisects $\measuredangle ABC$

Conclusion: ______________________________

Reason: ________________________________

Writing Proofs

Example 9:

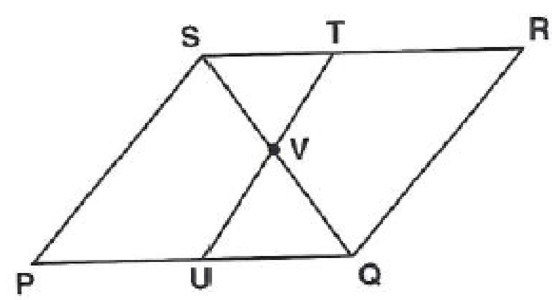


Given: $\overrightarrow{DB}$ bisects ∡ABC

Prove: ∡ABD ≅ ∡DBC

Statements	Reasons
1	1 Given
2 _____ ≅ _____	2

Challenge



10. Given: $\overline{SQ}$ ***and*** $\overline{UT}$ ***bisect each other.***

Conclusion: _________________________

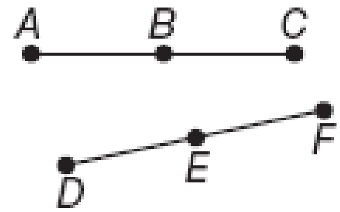
Statements	Reasons

11. **Given:** $\overline{AB} \cong \overline{DE}$

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

E is the midpoint of $\overline{DF}$.

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



Statements	Reasons

SUMMARY

Note: If an angle is bisected, you cannot draw any conclusions about line segments

If a line segment is bisected, you cannot draw any conclusions about angles.

Think of the bisector as a knife. It cuts another line segment in half. The knife does not get cut.

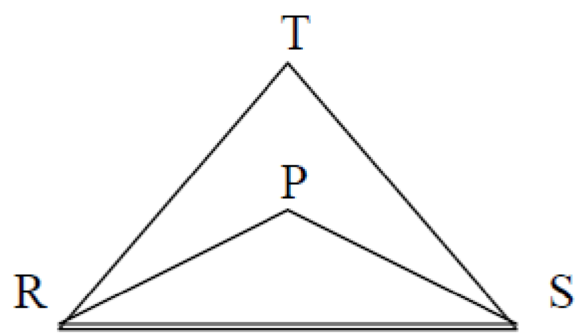
* except bisect each other.

Day 3 - Homework

1. Given: $\overline{WY} \cong \overline{XZ}$
Prove: $\overline{WX} \cong \overline{YZ}$

Statements	Reasons

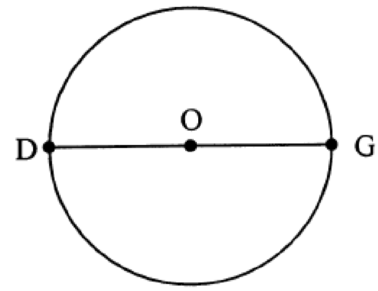
2. Given: $\measuredangle TRP \cong \measuredangle TSP$
$\measuredangle PRS \cong \measuredangle PSR$
Prove: $\measuredangle TRS \cong \measuredangle TSR$



Statements	Reasons

3. Given: O mdpt. $\overline{DG}$

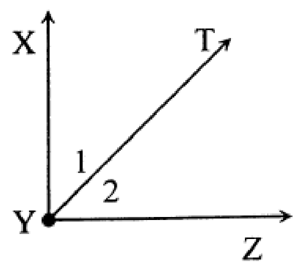
Prove: $\overline{DO} \cong \overline{OG}$



Statements	Reasons
1	1 **Given**
2 ____ $\cong$ ____	2

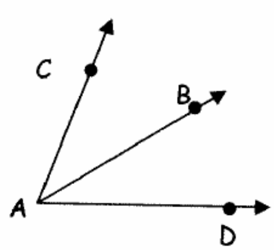
4. Given: $\overrightarrow{YT}$ bisect $\angle XYZ$

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



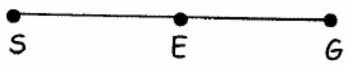
Statements	Reasons
1	1 **Given**
2 ____ $\cong$ ____	2

5.



1. $\overrightarrow{AB}$ bisects $\angle CAD$.	1. Given
2.	2.

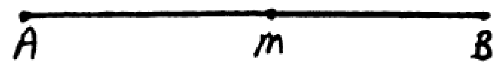
6.

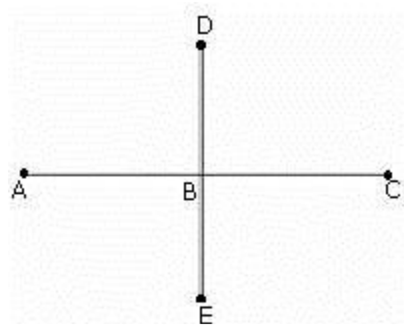


1. E is the midpoint of $\overline{SG}$	1. Given
2.	2.

7

S	R
1. $\overline{AM} \cong \overline{MB}$	1. GIVEN
2.	2.

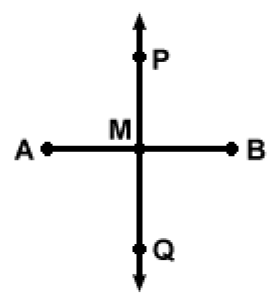




8.

Statements	Reasons
1 $\overline{DE}$ *bisects* $\overline{AC}$ *at* B.	1 *Given*
2	2

9. Given: $\overleftrightarrow{PQ}$ *bisects* $\overline{AB}$ *at* M.
Prove: $\overline{AM} \cong \overline{BM}$

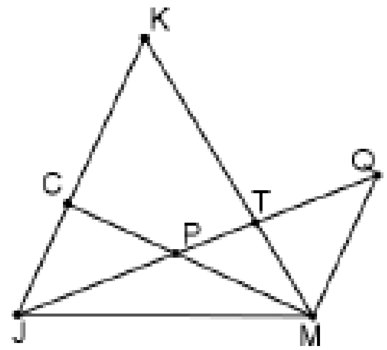


Statements	Reasons
1	1
2	2

Day 4 - Perpendicular Lines

Warm – Up

Given: $\overrightarrow{JT}$ $bisects$ $\overline{CM}$ at P.
Prove: $\overline{CP} \cong \overline{MP}$

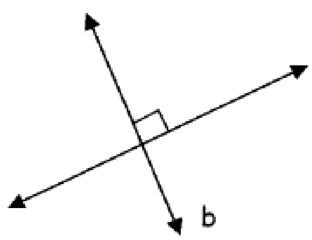


Statements	Reasons
1	1
2	2

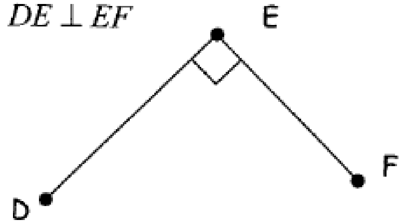
☑ Lines, rays, or segments that intersect at right angles are **PERPENDICULAR** (⊥).

Cond: If 2 lines are ⊥ , then they intersect at right ∠'s.
Conv: If 2 lines intersect at right ∠'s, then they are ⊥ .

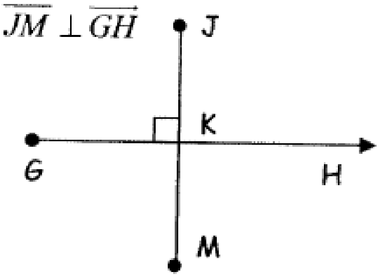
a ⊥ b



$\overline{DE} \perp \overline{EF}$



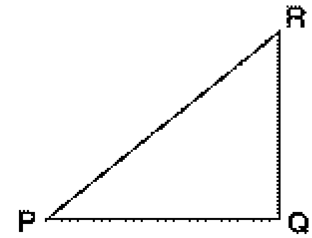
$\overline{JM} \perp \overrightarrow{GH}$



**Note: Never assume perpendicularity! Look for the 90° angle.

Drawing Conclusions with Perpendicularity!

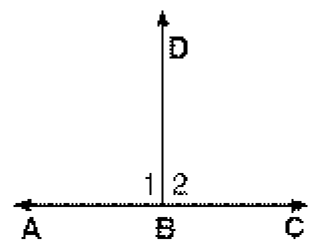
Example 1: Given: $\overline{PQ} \perp \overline{RQ}$



Conclusion 1: ______________________________

Reason: ___________________________________

Example 2: Given: $\overleftrightarrow{AC} \perp \overrightarrow{BD}$



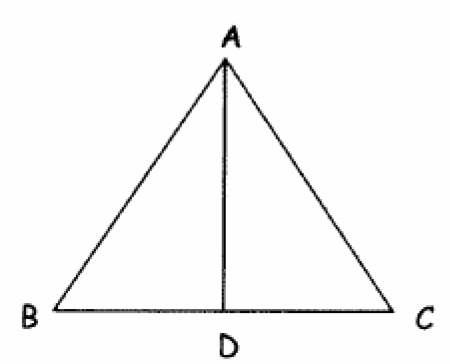
Conclusion 1: ______________________________

Reason: ___________________________________

Conclusion 2: ______________________________

Reason: ___________________________________

Example 3: Given: $\overline{AD} \perp \overline{BC}$



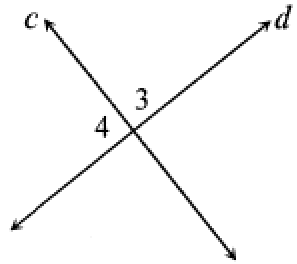
Conclusion 1: ______________________________

Reason: ___________________________________

Conclusion 2: ______________________________

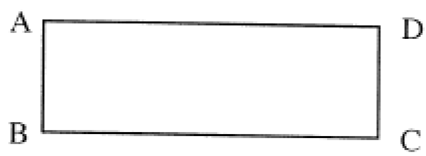
Reason: ___________________________________

Example 4: Given: $c \perp d$
Prove: $\angle 3 \cong \angle 4$



Statements	Reasons
1	1
2 ∡ ____ and ∡ ____ are right angles	2 ⊥ → ________________
3 ∡ ____ ≅ ∡ ____	3 *all right ∡'s are* ______

Example 5: Given: $\overline{AB} \perp \overline{BC}$
$\overline{BC} \perp \overline{DC}$
Prove: $\angle B \cong \angle C$

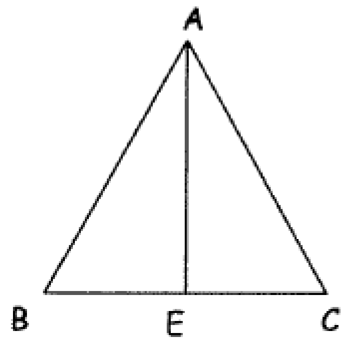


Statements	Reasons
1	1
2 ∡ ____ and ∡ ____ are right angles	2 ⊥ → ________________
3 ∡ ____ ≅ ∡ ____	3 *all right ∡'s are* ______

You Try It!

Example 6: Given: $\overline{AE} \perp \overline{BC}$

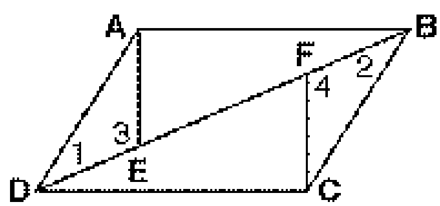
Prove: $\measuredangle BEA \cong \measuredangle CEA$



Statements	Reasons
1	1
2 $\measuredangle$ _____ and $\measuredangle$ _____ are right angles	2 $\perp \longrightarrow$ ____________________
3 $\measuredangle$ _____ $\cong$ $\measuredangle$ _____	3 *all right* $\measuredangle$*'s are* ______

Example 7: Given: $\overline{AE} \perp \overline{BD}$, $\overline{CF} \perp \overline{BD}$

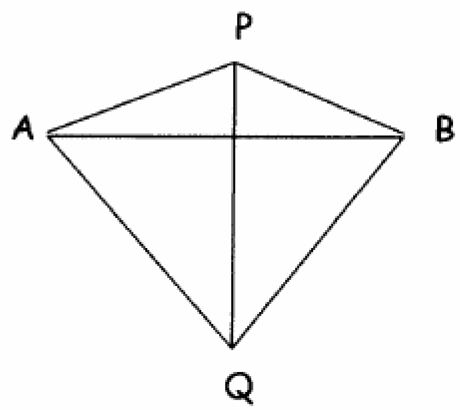
Prove: $\measuredangle 3 \cong \measuredangle 4$



Statements	Reasons
1	1
2	2
3	3

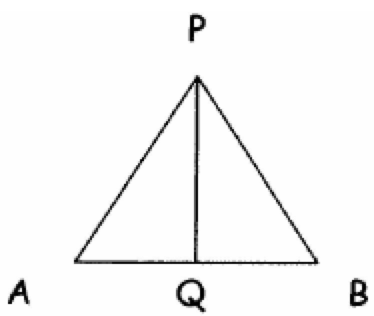
☑ The **PERPENDICULAR BISECTOR** of a segment is the line that bisects and is perpendicular to the segment.

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



Conclusions: ______________________ and _____________________

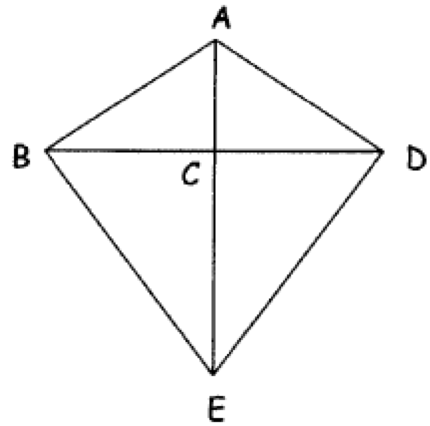
Given: $\overleftrightarrow{PQ}$ is the ⊥ bisector of $\overline{AB}$



Conclusions: ______________________ and _____________________

Example 8: Given: $\overleftrightarrow{AE} \perp$ bis. $\overline{BD}$

Prove: (a) ∡ BCA ≅ ∡ DCA
(b) $\overline{BC} \cong \overline{DC}$

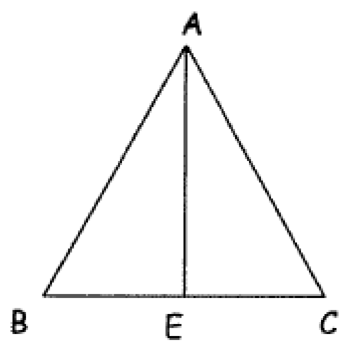


Statements	Reasons
1	1
2 ∡ ____ and ∡ ____ are right angles	2 ⊥ ⟶ ________________
3 ∡ ____ ≅ ∡ ____	3 *all right ∡'s are* ______
4 ____ ≅ ____	4 *definition of* ____________

Example 9: You Try!

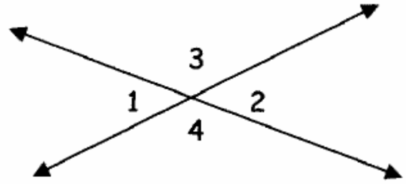
Given: $\overleftrightarrow{AE} \perp$ bis. $\overline{BD}$

Prove: (a) ∡ BEA ≅ ∡ CEA
(b) $\overline{BE} \cong \overline{CE}$



Statements	Reasons
1	1
2	2
3	3
4	4

☑ If two angles are **VERTICAL ANGLES,** then the rays forming the sides of the one and the rays forming the sides of the other are opposite rays.



Point out the opp. rays.

∠1 and ∠_____ are vertical angles.

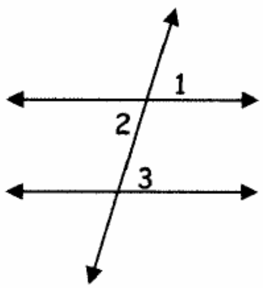
∠3 and ∠_____ are vertical angles.

How do vertical ∠'s compare in size?

Theorem: ______________________________

9. Given: ∠2 ≅ ∠3

Prove: ∠1 ≅ ∠3

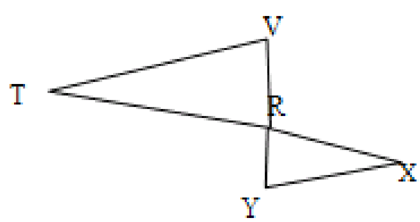


Statements	Reasons
1.	1. Given
2.	2.
3.	3.

---

10. Given: ∠V ≅ ∠YRX
∠Y ≅ ∠TRV

Prove: ∠V ≅ ∠Y

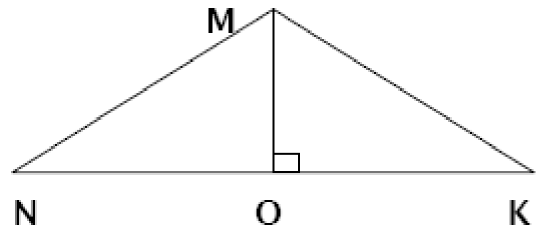


Statements	Reasons
1	1
2	2
3	3
4	4
5	5

Day 4 - Homework

1. Given: $\overline{MO} \perp \overline{NK}$

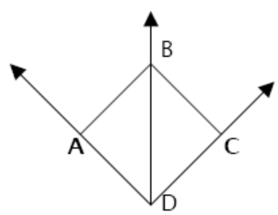
   Prove: $\measuredangle MON \cong \measuredangle MOK$



Statements	Reasons
1	1
2	2
3	3

2. Given: $\overline{BA} \perp \overrightarrow{DA}, \ \overline{BC} \perp \overrightarrow{DC},$

   Prove: $\measuredangle BAD \cong \measuredangle BCD$

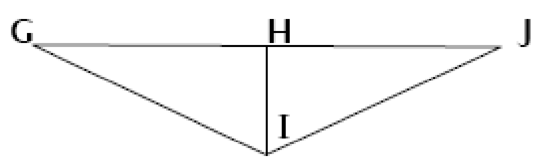


Statements	Reasons
1	1
2	2
3	3

3. Given: $\overline{IH}$ $\perp$ bis. $\overline{GJ}$

   Prove: (a) $\measuredangle$ GHI $\cong$ $\measuredangle JHI$

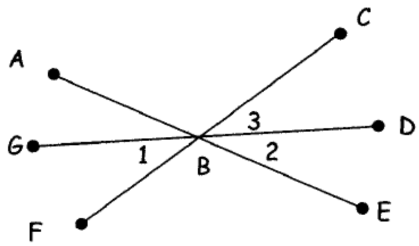
   (b) $\overline{GH} \cong \overline{JH}$



Statements	Reasons
1	1
2	2
3	3
4	4

4. Given: $\overleftrightarrow{GD}$ bisects $\angle CBE$

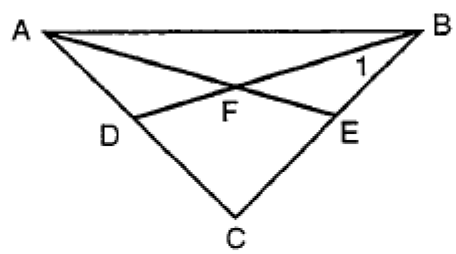
Prove: $\angle 1 \cong \angle 2$



Statements	Reasons
1.	1. *Given*
2. _____ ≅ _____	2. **If ∡ *bisector* → 2 ≅ ∡*s***
3. _____ ≅ _____	3. **Vertical Angles are ≅**
4. **∡1 ≅ ∡2**	4.

5. GIVEN: $\overline{AE}$ and $\overline{BD}$ intersect at F
$\angle 1 \cong \angle AFD$

Prove: $\angle 1 \cong \angle BFE$

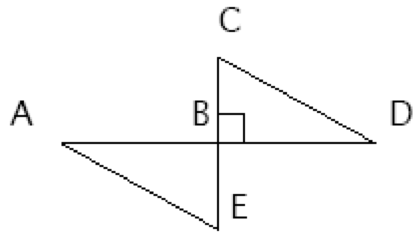


Statements	Reasons
1.	1. *Given*
2.	2. **Given**
3.	3. **Vertical Angles are ≅**
4. **∡1 ≅ ∡*BFE***	4.

Day 5 - Complementary and Supplementary Angles

Warm – Up

1. Given: $\overline{AD}$ is the $\perp$ bisector of $\overline{CD}$
Prove: (a) $\measuredangle CBD \cong \measuredangle EBA$
(b) $\overline{AB} \cong \overline{DB}$



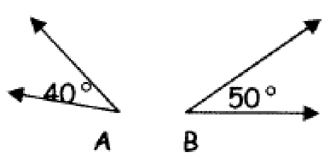
Statements	Reasons
1	1
2	2
3	3
4	4

☑ **COMPLEMENTARY ANGLES** are 2 ∠'s whose sum is 90° (a right angle). Each of the 2 ∠'s is called the **COMPLEMENT** of the other.

COND: If 2 ∠'s are complementary, then their sum is a right ∠. (90°)

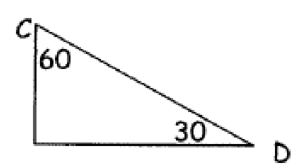
CONV: If the sum of 2 ∠'s is a right ∠ (90°), then they are complementary.

EX.



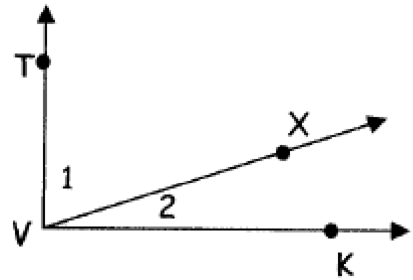
∠A and ∠B are complementary

EX.



∠C and ∠D are complementary

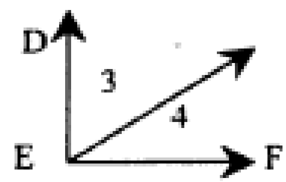
Example 1: Given: $\overleftrightarrow{TV} \perp \overrightarrow{VK}$
Prove: $\measuredangle 1$ *is comp to* $\measuredangle 2$



Statements	Reasons
1	1
2	2
3	3

You Try It!

Given: $\overleftrightarrow{DE} \perp \overleftrightarrow{EF}$
Prove: $\measuredangle 3$ *is comp to* $\measuredangle 4$



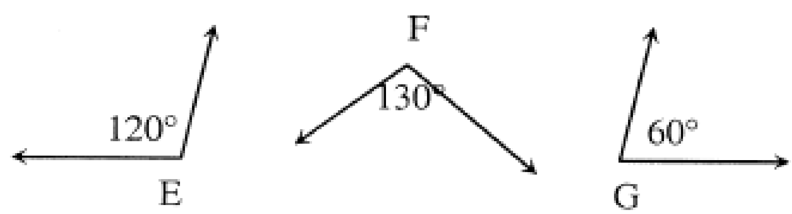
Statements	Reasons
1	1
2	2
3	3

☑ **SUPPLEMENTARY ANGLES** are 2 ∠'s whose sum is 180° (a straight angle). Each of the 2 ∠'s is called the **SUPPLEMENT** of the other.

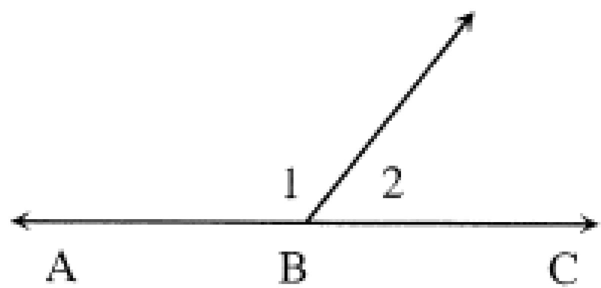
Supplementary Angles

- COND: If 2 ∠s are supp, then their sum is a straight ∠ (180°).
- CONV: If the sum of two ∠s is a straight ∠ (180°), then they are **supplementary**.

Example 3: ∡____ and ∡____ are supplementary angles.



Example 4:

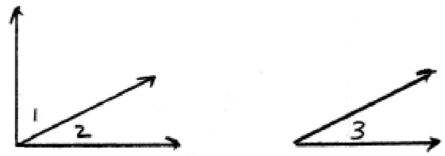


Given: diagram as shown
Prove: ∠1 supp ∠2

Statements	Reasons
1	1
2	2

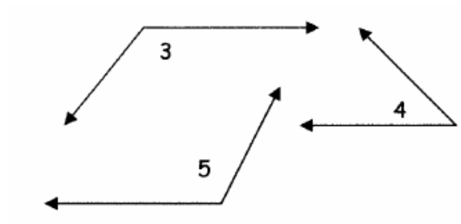
CONGRUENT COMPLEMENTS AND SUPPLEMENTS

1. Given: $\angle 1$ comp $\angle 2$
   $\angle 1$ comp $\angle 3$



Conclusion:____________________
Reason:____________________________________
____
____

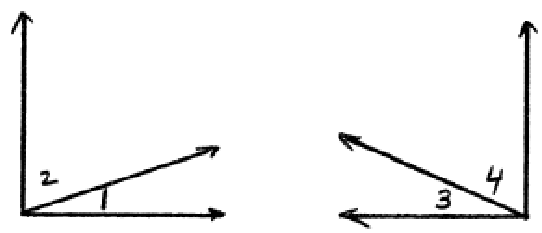
2. Given: $\angle 3$ is supp. to $\angle 4$
   $\angle 5$ is supp. to $\angle 4$



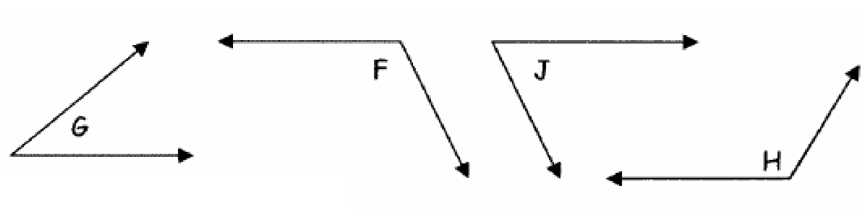
Conclusion:____________________
Reason:____________________________________
____
____

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

Conclusion:____________________
Reason:____________________________
____
____



4. Given: $\angle F$ is supp. to $\angle G$.
   $\angle H$ is supp. to $\angle J$.
   $\angle G \cong \angle J$



Conclusion:____________________
Reason:____________________________________
____
____

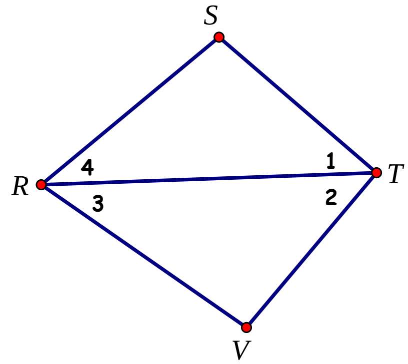
When to use these theorems??? When 2 pairs of angles are complementary or supplementary to the **SAME** angle or **CONGRUENT** angles.

Strategy: In statements, look for double use of the word "complementary" or "supplementary" AND for a congruence statement. Circle the angles indicated by the congruence statement, and the uncircled angles will be congruent! You don't even need to look at a diagram!

Proofs

Given: $\angle 1$ is compl. to $\angle 4$
$\angle 2$ is compl. to $\angle 3$
$\overrightarrow{RT}$ bisects $\angle SRV$

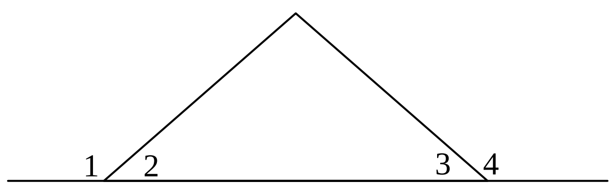
Prove: $\overrightarrow{TR}$ bisects $\angle STV$



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

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

Prove: $\angle 2 \cong \angle 3$



Statements	Reasons
1	1
2	2
3	3
4	4

Summary

Congruent and Right Angles

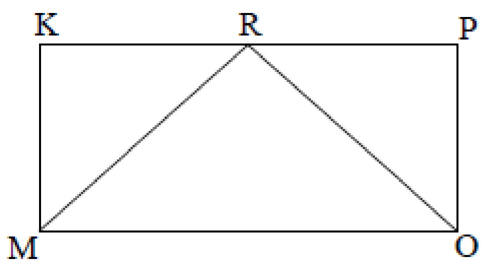
The Reflexive Property of Congruence, Symmetric Property of Congruence, and Transitive Property of Congruence all hold true for angles. The following theorems also hold true for angles.

Congruent Supplements Theorem	Angles supplement to the same angle or congruent angles are congruent.
Congruent Complement Theorem	Angles complement to the same angle or to congruent angles are congruent.
Vertical Angles Theorem	If two angles are vertical angles, then they are congruent.
Perpendicular Lines Theorem	Perpendicular lines intersect to form four right angles.
Right Angles Theorem	All right angles are congruent.
Theorem #1	Perpendicular lines form congruent adjacent angles.
Theorem #2	If two angles are congruent and supplementary, then each angle is a right angle.
Theorem #3	If two congruent angles form a linear pair, then they are right angles.

Challenge

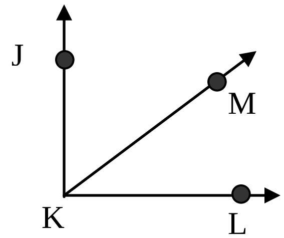
Given: $\overline{KM} \perp \overline{MO}$
$\overline{PO} \perp \overline{MO}$
$\angle KMR \cong \angle POR$

Prove: $\angle ROM \cong \angle RMO$



Day 5 - Homework

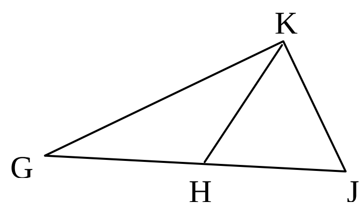
Example 1:



Given: $\overleftrightarrow{JK} \perp \overrightarrow{KL}$
Prove: $\measuredangle JKM \text{ is comp to } \measuredangle MKL$

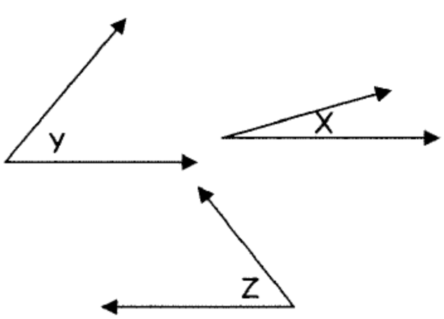
Statements	Reasons
1	1
2	2
3	3
4	4
5	5

2. Given: $\overline{GHJ}$ is a straight angle
Prove: ∠GHK is supplementary to ∠KHJ.



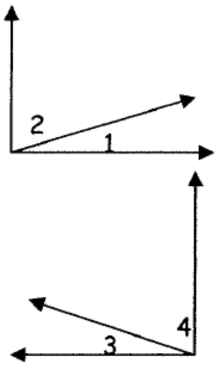
Statements	Reasons
1	1
2	2

3.



Statements	Reasons
1. ∠X comp. to ∠Y, ∠X comp. to ∠Z	1. Given
2.	2.

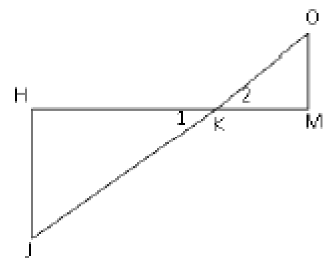
4.



Statements	Reasons
1. ∠1 comp. to ∠2, ∠3 comp. to ∠4, ∠1 ≅ ∠3	1. *Given*
2.	2.

5. Given: ∠O is complementary to ∠2
∠J is complementary to ∠1

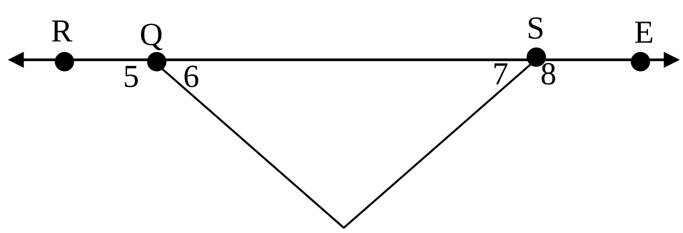
Prove: ∠O ≅ ∠J



Statements	Reasons
1	1
2	2
3	3
4	4

6. Given: ∠6 ≅ ∠7

Prove: ∠5 ≅ ∠8

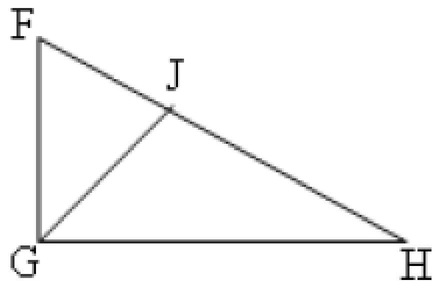


Statements	Reasons
1	1
2	2
3	3
4	4

Day 6 - Proofs Involving Parallel Lines

Warm – Up

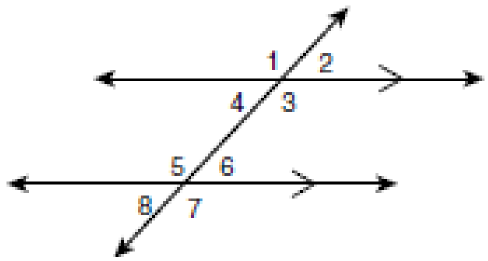
Given: ∠F is complementary to ∠FGJ
∠H is complementary to ∠HGJ
$\overrightarrow{GJ}$ Bisects ∠FGH
Prove: ∠F ≅ ∠H



Statements	Reasons

Angles Formed by Parallel Lines

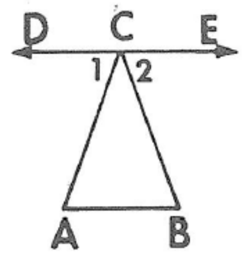
The angles in this figure can be compared using the following Postulates and Theorems.



Corresponding Angles Postulate	If two parallel lines are cut by a transversal, then the pairs of corresponding angles are **congruent.**	Name the pairs of angles *congruent* by the Corresponding Angles Postulate. **1.** ____________ **2.** ____________ **3.** ____________ **4.** ____________
Alternate Interior Angles Theorem	If two parallel lines are cut by a transversal, then the two pairs of alternate interior angles are **congruent.**	Name the pairs of angles *congruent* by the Alternate Interior Angles Theorem. **5.** ____________ **6.** ____________
Alternate Exterior Angles Theorem	If two parallel lines are cut by a transversal, then the two pairs of alternate exterior angles are **congruent.**	Name the pairs of angles *congruent* by the Alternate Exterior Angles Theorem. **7.** ____________ **8.** ____________
Same-Side Interior Angles Theorem	If two parallel lines are cut by a transversal, then the two pairs of same-side interior angles are **supplementary.**	Name the pairs of angles *supplementary* by the Same-Side Interior Angles Theorem. **9.** ____________ **10.** ____________

1. Given: $\overleftrightarrow{DCE} \parallel \overline{AB}$ and $\angle 1 \cong \angle 2$

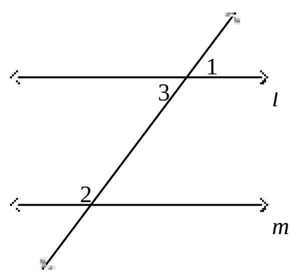
Prove: $\angle A \cong \angle B$



Statements	Reasons

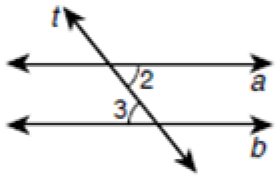
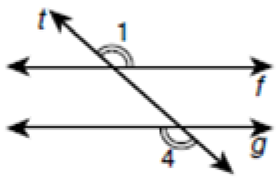
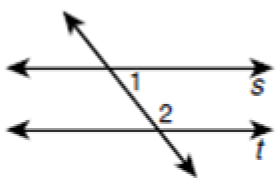
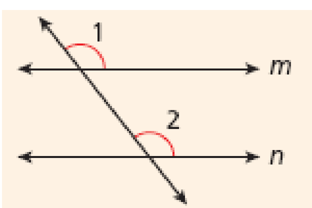
2. Given: ***l* || *m***

Prove: ***∠1*** is supplementary ***∠2***



Statements	Reasons

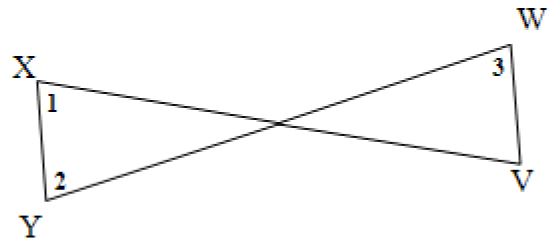
You can also prove that two lines are parallel by using the converse of any of the other theorems that you learned in Lesson 3-2.

If you're given…	Conclusion	Theorem
 $\angle 2 \cong \angle 3$	$a \parallel b$	**Converse of the Alternate Interior Angles Theorem**
 $\angle 1 \cong \angle 4$	$f \parallel g$	**Converse of the Alternate Exterior Angles Theorem**
 $m\angle 1 + m\angle 2 = 180°$	$s \parallel t$	**Converse of the Same-Side Interior Angles Theorem**
 $\angle 1 \cong \angle 2$	$m \parallel n$	**Converse of the Corresponding Angles Postulate**

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

$\angle 3 \cong \angle 1$

Prove: $\overline{XY} \parallel \overline{WV}$



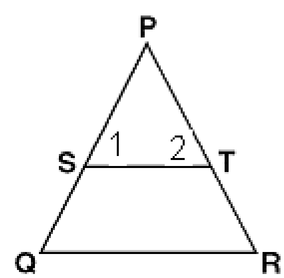
Statements	Reasons

---

4. Given: $\measuredangle 1 \cong \measuredangle 2$

$\measuredangle 1 \cong \measuredangle R$

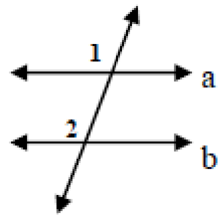
Prove: $\overline{ST} \parallel \overline{QR}$



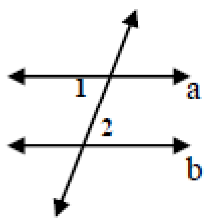
Statements	Reasons

Homework

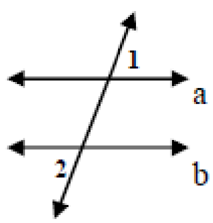
In each case, state the theorem that proves the angles are congruent or supplementary given that the lines are parallel.

1. 

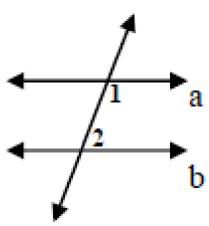
Statements	Reasons
1 a || b	1 Given
2	2

2. 

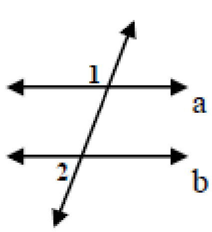
Statements	Reasons
1 a || b	1 Given
2	2

3. 

Statements	Reasons
1 a || b	1 Given
2	2

4. 

Statements	Reasons
1 a || b	1 Given
2	2

5. 

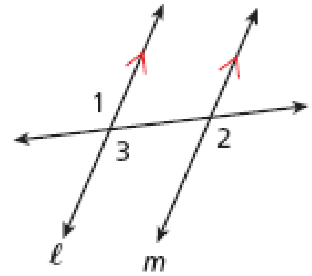
Statements	Reasons
1 a || b	1 Given
2	2

6) **Complete the two-column proof of the Alternate Exterior Angles Theorem.**

Given: $\ell \parallel m$

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

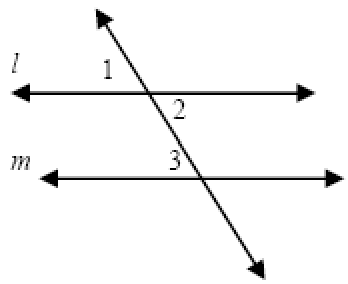
Proof:

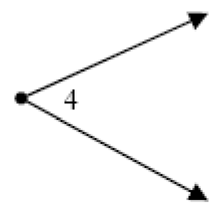


Statements	Reasons
1. $\ell \parallel m$	1. Given
2. a. ___?___	2. Vert. ∡ Thm.
3. $\angle 3 \cong \angle 2$	3. b. ___?___
4. c. ___?___	4. d. ___?___

7) Given: $l \,||\, m$; $\angle 2 \cong \angle 4$

Prove: $\angle 4 \cong \angle 3$



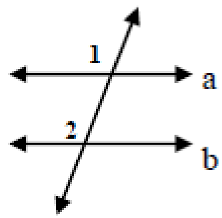


Statements	Reasons

In each case, use the converse that proves *a* || *b*.

8. Given: ∡1 ≅ ∡2

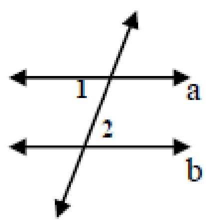
Prove: a ∥ *b*



Statements	Reasons
1	1 Given
2 a ∥ b	2

9. Given: ∡1 ≅ ∡2

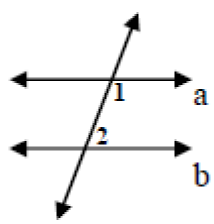
Prove: a ∥ *b*



Statements	Reasons
1	1 Given
2 a ∥ b	2

10. Given: ∡1 *is suppl*. ∡2

Prove: a ∥ *b*

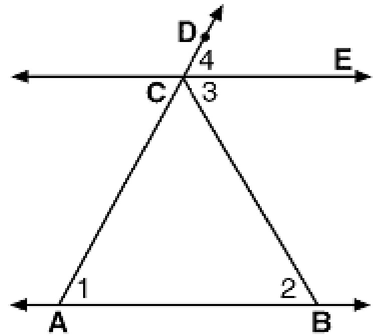


Statements	Reasons
1	1 Given
2 a ∥ b	2

11. Given: $\angle 1 \cong \angle 3$

$\overrightarrow{CE}$ bisects $\angle DCB$

Prove: $\overleftrightarrow{CE} \parallel \overleftrightarrow{AB}$

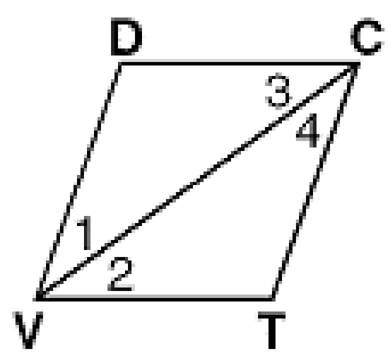


Statements	Reasons
1.	1. Given
2.	2. Given
3. $\measuredangle$ _____ $\cong$ $\measuredangle$ _____	3.
4. $\measuredangle$ _____ $\cong$ $\measuredangle$ _____	4.
5. $\overleftrightarrow{CE} \parallel \overleftrightarrow{AB}$	5.

12. Given: $\overline{VC}$ *bisects* $\measuredangle DVT$

$\measuredangle 1 \cong \measuredangle 3$

Prove: $\overline{CD} \parallel \overline{VT}$



Statements	Reasons
1.	1. Given
2.	2. Given
3. $\measuredangle$ _____ $\cong$ $\measuredangle$ _____	3.
4. $\measuredangle$ _____ $\cong$ $\measuredangle$ _____	4.
5. $\overleftrightarrow{CE} \parallel \overleftrightarrow{AB}$	5.

REVIEW – Day 1

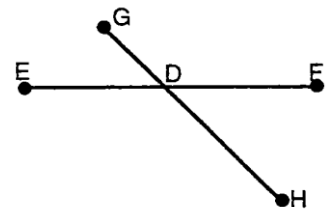
Section 1: Drawing Conclusions using Midpoint, Bisector, and Perpendicular

1. Given: M is the midpoint of $\overline{CD}$.

Conclusion: ______________________________

Reason: ______________________________

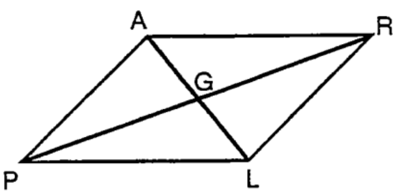
2. $\overline{GH}$ bisects $\overline{EF}$.



Conclusion: ______________________________

Reason: ______________________________

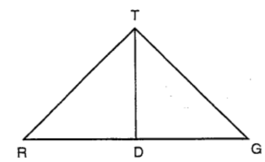
3. Given: $\overline{RP}$ bisects $\angle ARL$.



Conclusion: ______________________________

Reason: ______________________________

4. Given: $\overline{TD} \perp \overline{RG}$



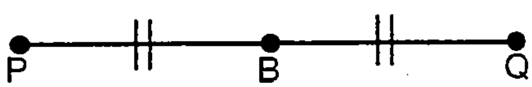
Conclusion 1: ______________________________

Reason: ______________________________

Conclusion 2: ______________________________

Reason: ______________________________

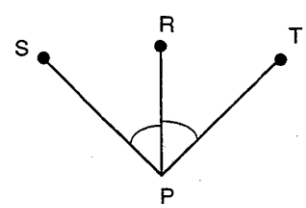
5. Given: Diagram as shown.



Conclusion: B is the midpoint of ______________

Reason: ______________________________

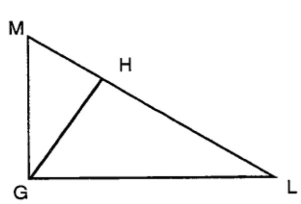
6. Given: Diagram as shown.



Conclusion: $\overline{PR}$ bisects ______________

Reason: ______________________________

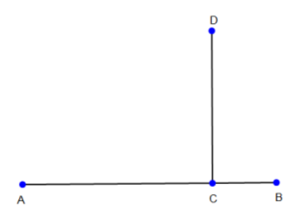
7. Given: $\angle GHL$ is a right angle.



Conclusion: $\overline{GH} \perp$ ______________

Reason: ______________________________

8. Given: $\overline{CD} \perp \overline{AB}$.

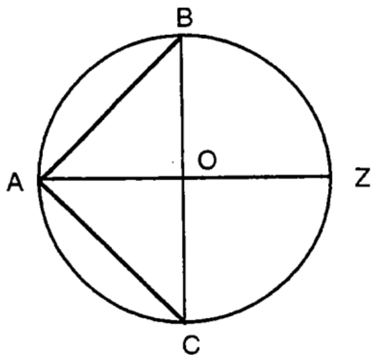


Conclusion: $\angle ACD$ is a ______________.

$\angle BCD$ is a ______________.

Reason: Perpendicular lines form ______________.

Let's Put it all together!

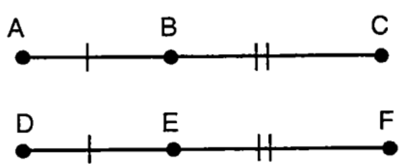


Given: O is the midpoint of $\overline{BC}$
$\overline{AZ}$ bisects ∠BAC
$\overline{BC} \perp \overline{AZ}$

CONCLUSIONS	REASONS
1. $\overline{BO}$ ≅	1. ______________________
2. ∠BAO ≅	2. ______________________
3. ∠BOA and ∠ ? are right angles.	3. ______________________
4. ∠BOA ≅	4. ______________________

Section 2: Drawing Conclusions using the Addition and Subtraction Postulates

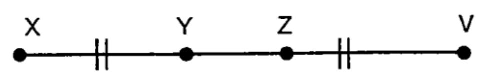
9. Given: Diagram as shown.



Conclusion: $\overline{AC}$ ≅ ______________________

Reason: ______________________

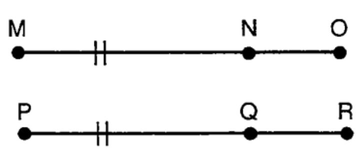
10. Given: Diagram as shown.



Conclusion: ______________________

Reason: ______________________

11. Given: $\overline{MO} \cong \overline{PR}$.



Conclusion: ______________________

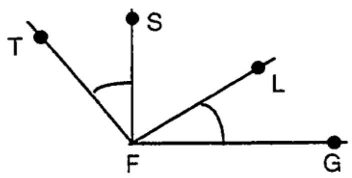
Reason: ______________________

12. Given: $\overline{DF} \cong \overline{EG}$

Conclusion: ______________________

Reason: ______________________

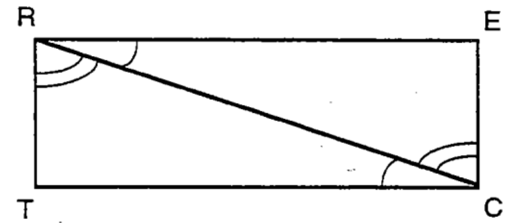
13. Given: Diagram as shown.



Conclusion: ∠TFL ≅ ______________________

Reason: ______________________

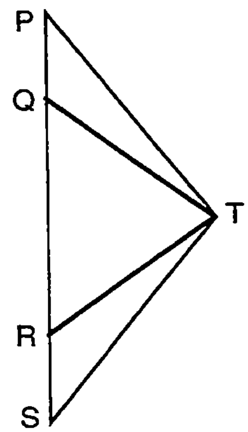
14. Given: Diagram as shown.



Conclusion: ______________________

Reason: ______________________

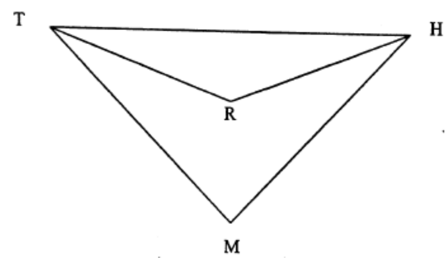
15. Given: ∠PTR ≅ ∠STQ.



Conclusion: ∠PTQ ≅ ______________________

Reason: ______________________

16. Given: ∠ MTH ≅ ∠ MHT
∠RTH ≅ ∠RHT

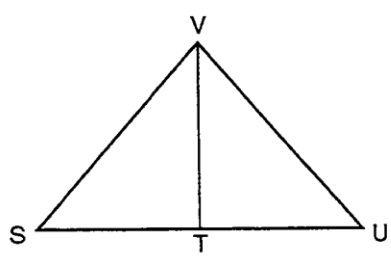


Conclusion: ______________________

Reason: ______________________

Section 3: Drawing Conclusions using the Substitution and Transitive Property

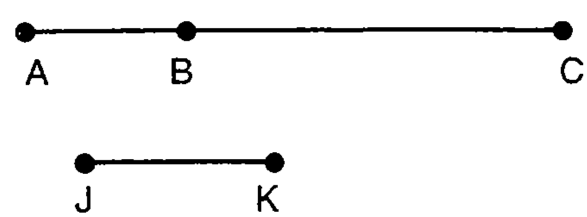
17. Given: $\overline{ST} \cong \overline{VT}$, $\overline{VT} \cong \overline{TU}$



Conclusion: ______________________

Reason: ______________________

18. Given: AB + BC = AC, AB = JK

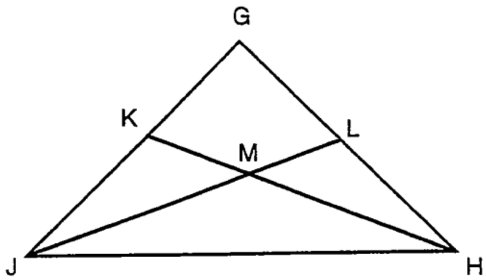


Conclusion: ______________________

Reason: ______________________

Section 4: Vertical Angles

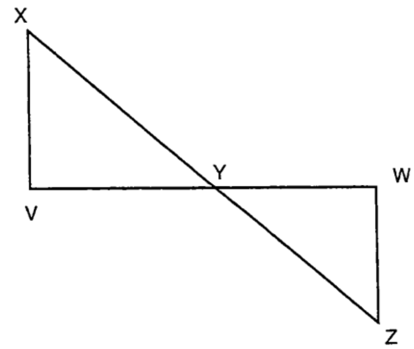
19. Name 2 pairs of vertical angles.



∡______ and ∡______

∡______ and ∡______

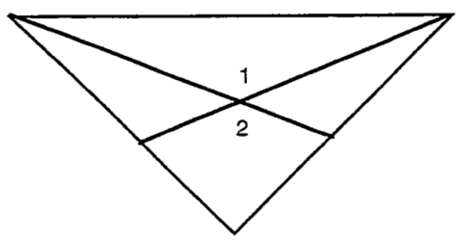
20. Name 2 pairs of vertical angles.



∡______ and ∡______

∡______ and ∡______

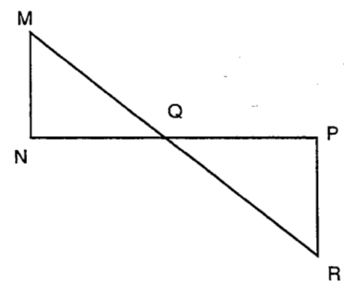
21. Given: Diagram with intersecting lines as shown.



Conclusion: ∠1 ≅ ______________________

Reason: ______________________

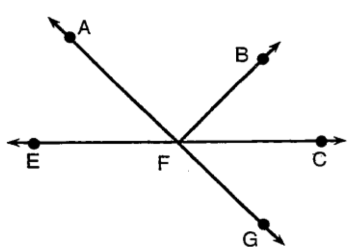
22. Given: Diagram with intersecting lines as shown.



Conclusion: ∠MQN ≅ ______________________

Reason: ______________________

23. Given: Diagram with intersecting lines as shown.



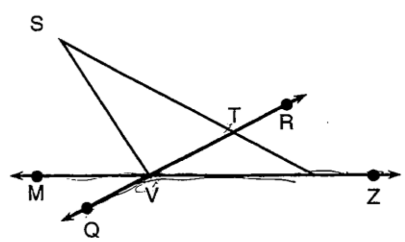
Conclusion 1: ∠AFE ≅ ______________________

Reason: ______________________

Conclusion 2: ∠CFA ≅ ______________________

Reason: ______________________

24. Given: Diagram with intersecting lines as shown.



Conclusion 1: ∠MVQ ≅ ______________________

Reason: ______________________

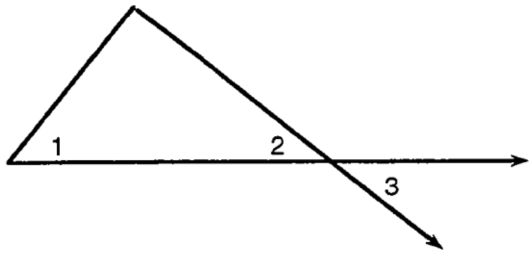
Conclusion 2: ∠QVZ ≅ ______________________

Reason: ______________________

25. For each of the following use the given information to:

A) Mark the diagram with the given information.
B) Draw or complete a valid conclusion.
C) State the reason for your conclusion.

Given: ∠1 ≅ ∠2 and the lines intersecting as shown.



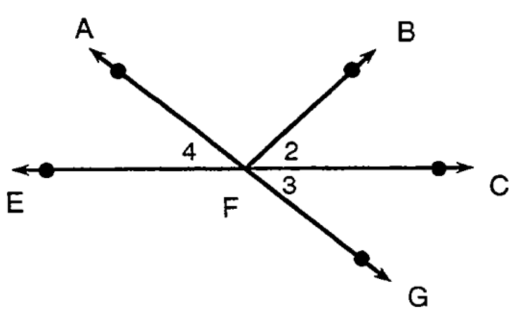
Conclusion 1: ∠2 ≅ ∠3 Reason 1: ______________________

Conclusion 2: ∠1 ≅ ∠3 Reason 2: ______________________

26. For each of the following use the given information to:

A) Mark the diagram with the given information.
B) Draw or complete a valid conclusion.
C) State the reason for your conclusion.

Given: $\overline{FC}$ bisects ∠BFG. $\overleftrightarrow{AG}$, $\overleftrightarrow{EC}$ and $\overrightarrow{FB}$ intersect at F.



Conclusion 1: ∠2 ≅ ∠3 Reason 1: ______________________

Conclusion 2: ∠2 ≅ ∠4 Reason 2: ______________________

Conclusion 3: ∠3 ≅ ∠4 Reason 3: ______________________

Section 5: Complementary and Supplementary Angles

Write the word or words which will complete the statement.

27.

a) The sum of the measures of 2 supplementary angles is a ________ angle.

b) The sum of the measures of 2 complementary angles is a ________ angle.

c) If the sum of the measures of 2 angles is 90, the angles are __________.

d) If the sum of the measures of 2 angles is180, the angles are __________.

28.

a) If two angles form a right angle, then the angles are __________.

b) If two angles form a straight angle, then the angles are __________.

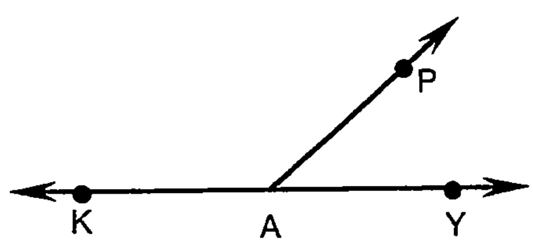
c) If two angles are supplementary to the same angle, then the angles are ________ to each other.

d) If two angles are complementary to the same angle, then the angles are ________ to each other.

29. Given: $\overleftrightarrow{KAY}$

Conclusion: ______________________________

Reason: ______________________________



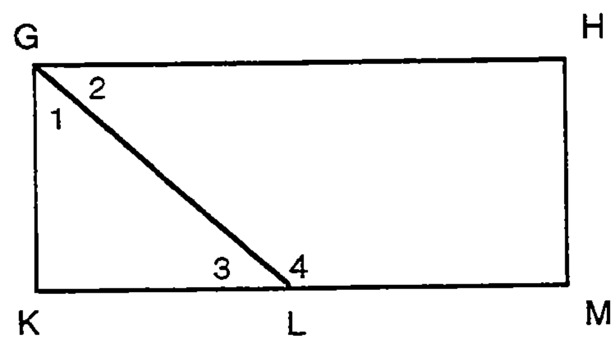
30. Given: $\overleftrightarrow{KLM}$ *and* $\measuredangle KGH$ *is a right angle.*

Conclusion 1: ∠1 and ∠2 are ______________

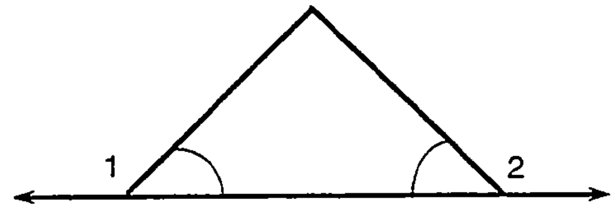
Reason: ______________________________

Conclusion 2: ∠3 and ∠4 are ______________

Reason: ______________________________



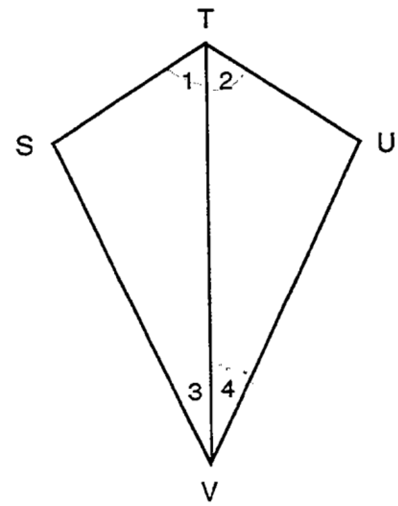
31. Given: Diagram with intersecting lines as shown.



Conclusion: ∠1 ≅ ____________

Reason: ____________

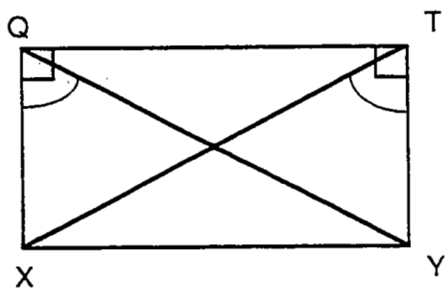
32. Given: ∠1 and ∠3 are complementary
∠2 and ∠4 are complementary
∠1 ≅ ∠2



Conclusion: ____________

Reason: ____________

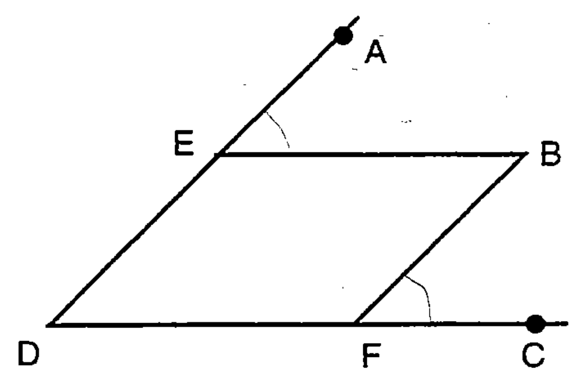
33. Given: Diagram with intersecting lines as shown.



Conclusion: ∠TQY ≅ ____________

Reason: ____________

34. Given: ∠AEB ≅ ∠BFC

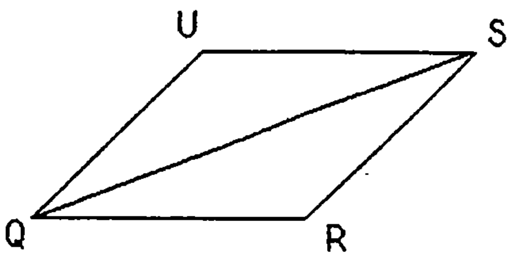


Conclusion: ____________

Reason: ____________

Section 6: Angles associated with Parallel Lines

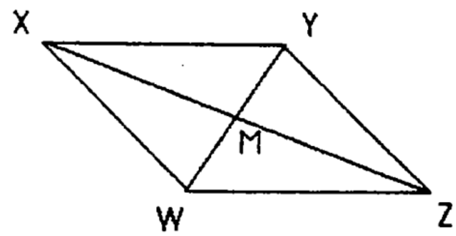
37. Given: $\overline{QU} \parallel \overline{RS}$



Conclusion: ∡______ ≅ ∡______

Reason: ______________________________

38. Given: $\overline{XY} \parallel \overline{WZ}$

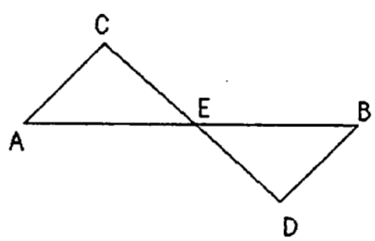


Conclusion: ∡______ ≅ ∡______

∡______ ≅ ∡______

Reason: ______________________________

39. Given: $\overline{AC} \parallel \overline{DB}$

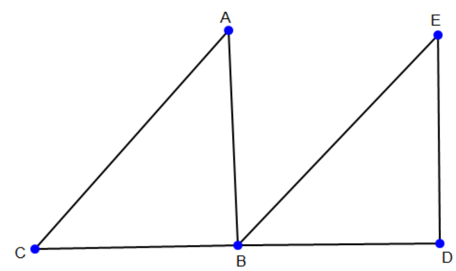


Conclusion: ∡______ ≅ ∡______

∡______ ≅ ∡______

Reason: ______________________________

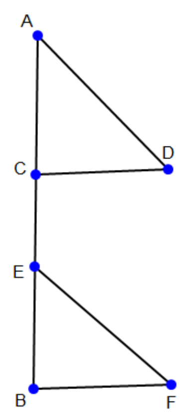
40. Given: $\overline{CA} \parallel \overline{BE}$



Conclusion: ∡______ ≅ ∡______

Reason: ______________________________

41. Given: $\overline{DA} \parallel \overline{FE}$



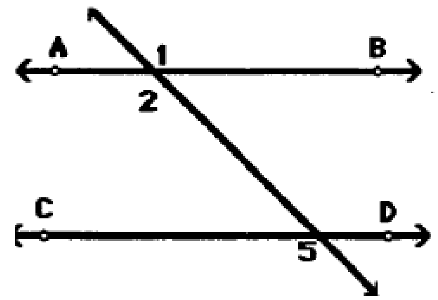
Conclusion: ∡______ ≅ ∡______

Reason: ______________________________

Section 7: Proving Parallel Lines

42.

Given: $\angle 1 \cong \angle 5$

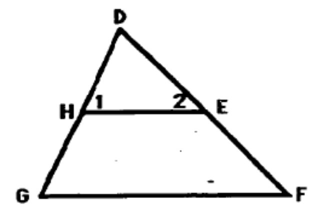


Conclusion 1: ∡_______ ≅ ∡_______ Reason 1: ______________________________

Conclusion 2: ∡_______ ≅ ∡_______ Reason 2: ______________________________

Conclusion 3: $\overline{AB} \parallel \overline{CD}$ Reason 3: ______________________________

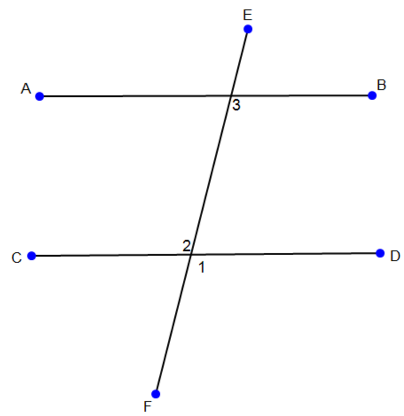
43. Given: ∡1 ≅ ∡2
∡2 ≅ ∡G



Conclusion 1: ∡_______ ≅ ∡_______ Reason 1: ______________________________

Conclusion 2: ___ ∥ ____ Reason 2: ______________________________

44. Given: ∡1 ≅ ∡3



Conclusion 1: ∡_______ ≅ ∡_______ Reason 1: ______________________________

Conclusion 2: ∡_______ ≅ ∡_______ Reason 2: ______________________________

Conclusion 3: $\overline{AB} \parallel \overline{CD}$ Reason 3: ______________________________

Practice Beginning Proofs TEST

I. Use the properties of equality to verify and prove the following:

Given: $3(x - 4) = 2x + 7$

Prove: $x=19$

Proof

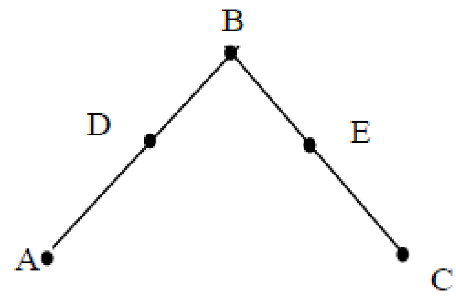
II. Define the following vocabulary words:

1. Midpoint____
2. Right angle____
3. Segment bisector____
4. Angle bisector____
5. Perpendicular lines____
6. Complementary Angles ____
7. Supplementary Angles ____
8. Linear Pair ____

Complete the missing information in the following proof

1. Given: $\overline{AD} \cong \overline{CE}, \overline{DB} \cong \overline{EB}$

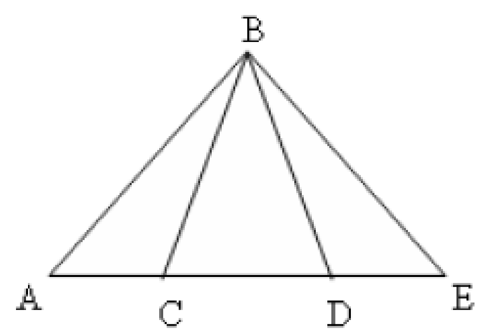
Prove: $\overline{AB} \cong \overline{CB}$



Proof

2. **Given: ∡ABD ≅ ∡EBC**

Prove: ∡ABC ≅ ∡EBD



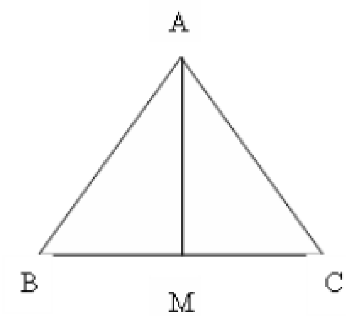
Proof

III. State the property that justifies each statement:

1. $\overline{AC} \cong \overline{AC}$ ____
2. If $\overline{LM} \cong \overline{XY}$ then $\overline{XY} \cong \overline{LM}$ ________________________________
3. If $\overline{AB} \cong \overline{CD}$ and $\overline{CD} \cong \overline{ST}$, then $\overline{AB} \cong \overline{ST}$ ______________________
4. If PQ = RS, Then PQ + QR = RS + QR ________________________
5. If the m ∡ 1+ m ∡ 2 = 90 and m ∡2 = m ∡3, then m ∡1 + m ∡3 = 90

   ____

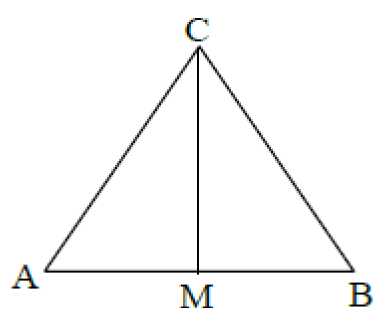
IV. Prove the Following:



6. **Given:** $\overline{AM} \perp \overline{BC}$

   Prove: ∡BMA ≅ ∡CMA

Proof



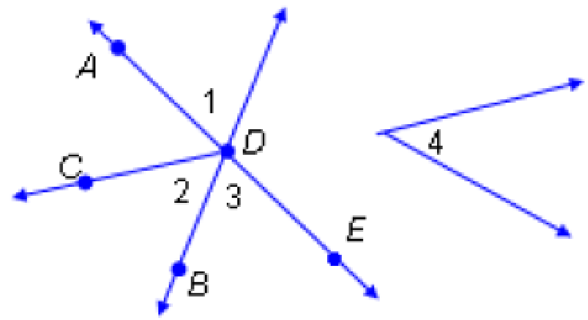
7. Given: $\overline{CM}$ bisects $\overline{AB}$

   Prove: $\overline{AM} \cong \overline{MB}$

   Proof

8. **Given:** $\overline{DB}$ bisects $\angle CDE$
$\angle 1 \cong \angle 4$

Prove: $\angle 2 \cong \angle 4$



Proof

9. Given: B is the midpoint of $\overline{AC}$

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

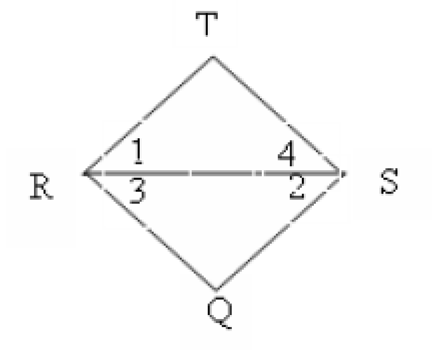
Prove: $\overline{AB} \cong \overline{CD}$

Proof

10. **Given:** TR ⊥ RQ, TS ⊥ SQ

$\angle 3 \cong \angle 4$

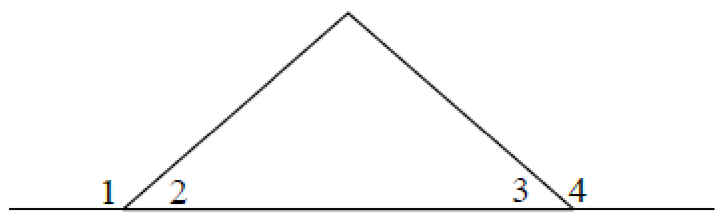
Prove: $\angle 1 \cong \angle 2$



Proof

11. Given: $\angle 2 \cong \angle 3$

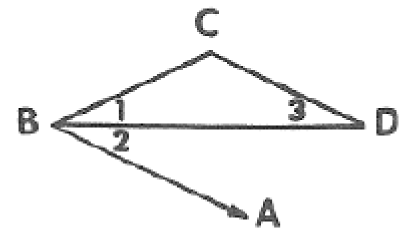
Prove: $\angle 1 \cong \angle 4$



Proof

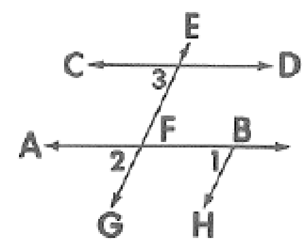
12. *Given:* $\overline{BD}$ bisects $\angle ABC$ and $\angle 1 \cong \angle 3$

Prove: $\overline{CD} \parallel \overrightarrow{BA}$.



Proof

13. If $\angle 1 \cong \angle 3$ and $\angle 3 \cong \angle 2$, prove that $\overrightarrow{BH} \parallel \overleftrightarrow{EG}$.



Proof