

UNIT 8B Similarity, Congruence and Proofs
Accelerated CCGPS Algebra/Geometry

Standards:

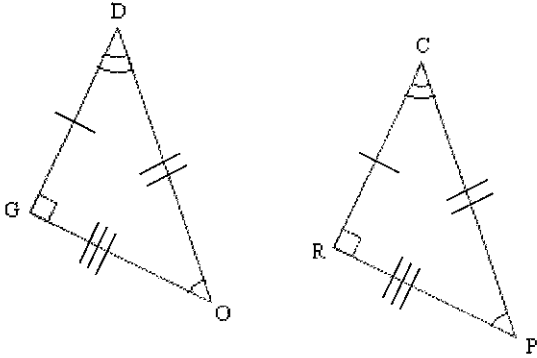
- Understand similarity in terms of similar transformations
- Prove theorems involving similarity
- Understand congruence in terms of rigid motions
- Prove geometric theorems
- Make geometric constructions

Date	Topic	Practice
Thursday 3-23	<i>Corresponding Parts of Congruent Triangles</i> Notes Pages 1-2	CPCT Practice Congruence and Triangles pages 3-4
Friday 3-24	<i>Congruent Triangles</i> Vocabulary flip-chart: Proving Triangles are Congruent PowerPoint	Congruent Triangles pages 5-7
Monday 3-27	<i>Congruent Triangles</i> Practice	Congruent Triangles pages 8-11b
Tuesday 3-28	<i>Congruent Triangles</i> HW - Q&A Triangle Congruency Proofs	Congruent Triangles page 12
Wednesday 3-29	<i>Congruent Triangles / Midsegment</i> Congruent Triangles Quiz Midsegments of Triangles Discovery page 13	Midsegment of a Triangle Pages 14-15
Thursday 3-30	<i>Proving Similar Triangles</i>	Similar Triangles pages 16-18
Friday 3-31	<i>Points of Concurrency</i> graphic organizer /properties page 19 and 20 Geogebra-example of points Points of Concurrency Examples	Points of Concurrency pages 21-23
Monday 4-10	<i>Points of Concurrency</i> Points of Concurrency Review	Points of Concurrency pages 24-26
Tuesday 4-11	<i>Points of Concurrency</i> Review for Test 8B	Review for Test 8B pages 27-29
Wednesday 4-12	<i>Congruent Triangles / Points of Concurrency / Midsegment</i> Test 8B	<i>Constructions of Centers of Triangles- Learning Task (Medians)</i>
Thursday 4-13	<i>Constructions of Centers of Triangles-Learning Task (Altitudes and Angle Bisectors)</i>	<i>Constructions of Centers of Triangles- Learning Task (perpendicular bisectors)</i>
Friday 4-14	<i>Go over task and constructions</i>	

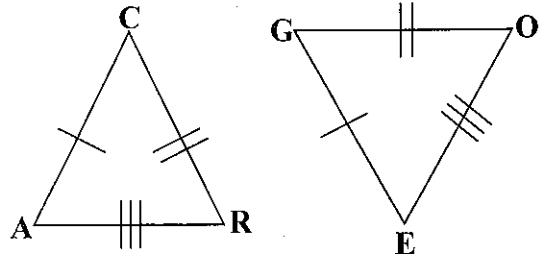
Triangle Congruence

I. Name the congruent triangles.

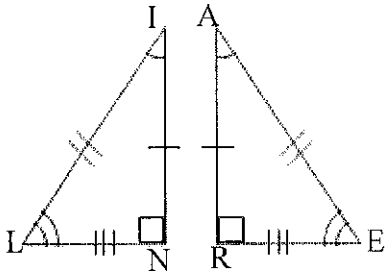
1. $\triangle OGD \cong \triangle$ _____



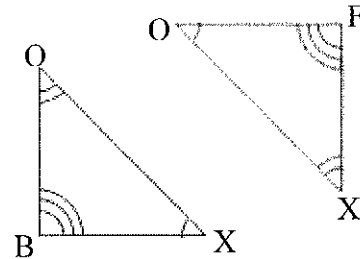
2. $\triangle RAC \cong \triangle$ _____



3. $\triangle LIN \cong \triangle$ _____

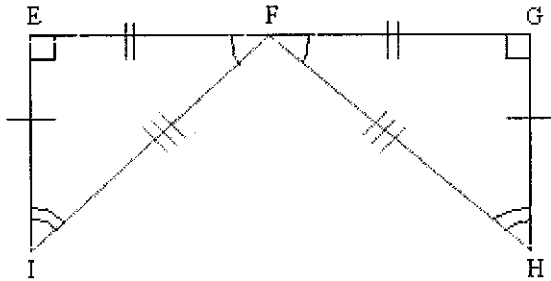


4. $\triangle FOX \cong \triangle$ _____



II. Name the congruent triangle and the congruent parts..

7.



$\triangle FGH \cong \triangle$ _____

$\angle EFI \cong \angle$ _____

$\overline{FG} \cong$ _____

$\angle G \cong \angle$ _____

$\overline{GH} \cong$ _____

$\angle H \cong \angle$ _____

$\overline{FH} \cong$ _____

Use the congruency statement to fill in the corresponding congruent parts.

8. $\triangle EFI \cong \triangle HGI$

$\angle E \cong \angle$ _____

$\overline{FE} \cong$ _____

$\angle EFI \cong \angle$ _____

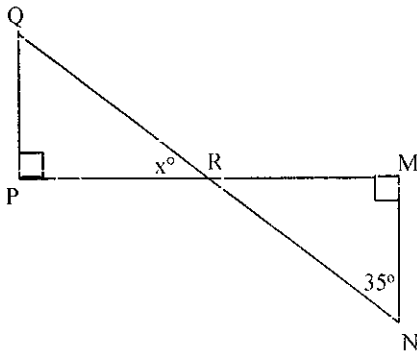
$\overline{FI} \cong$ _____

$\angle FIE \cong \angle$ _____

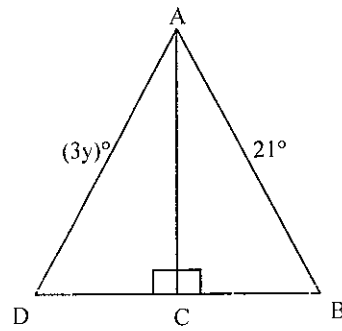
$\overline{IE} \cong$ _____

Notes

9. $\triangle PQR \cong \triangle MNR$. Find x .



10. $\triangle ABC \cong \triangle ADC$. Find y .



Third Angles Theorem (add to Theorems, Postulates and Definitions Card) –

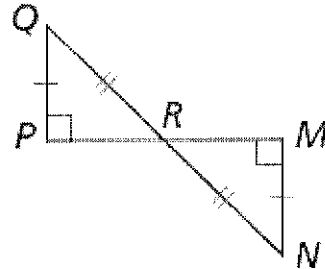
Proving Triangles Congruent

Given: $\angle P$ and $\angle M$ are right angles.

R is the midpoint of \overline{PM} .

$\overline{PQ} \cong \overline{MN}$, $\overline{QR} \cong \overline{NR}$

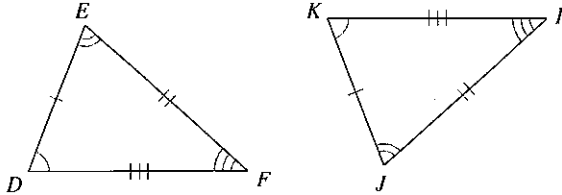
Prove: $\triangle PQR \cong \triangle MNR$



Congruence and Triangles

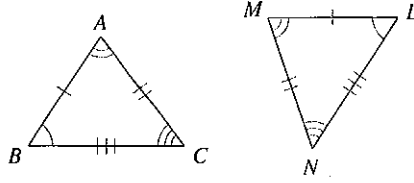
Complete each congruence statement by naming the corresponding angle or side.

1) $\triangle DEF \cong \triangle KJI$



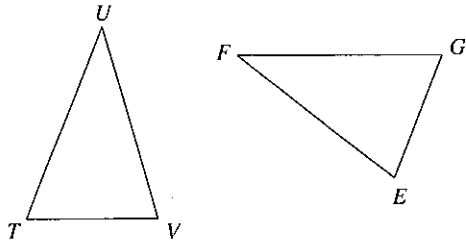
$\overline{FD} \cong ?$

2) $\triangle BAC \cong \triangle LMN$



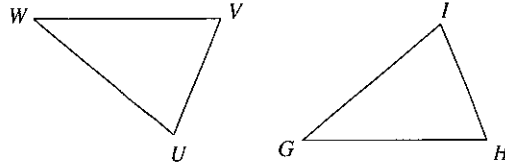
$\angle A \cong ?$

3) $\triangle TUV \cong \triangle GFE$



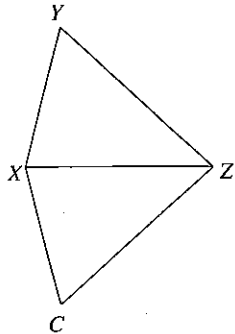
$\angle U \cong ?$

4) $\triangle WVU \cong \triangle GHI$



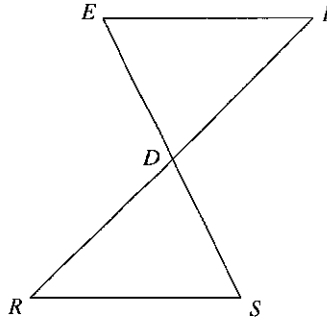
$\angle W \cong ?$

5) $\triangle ZXY \cong \triangle ZXC$



$\angle Y \cong ?$

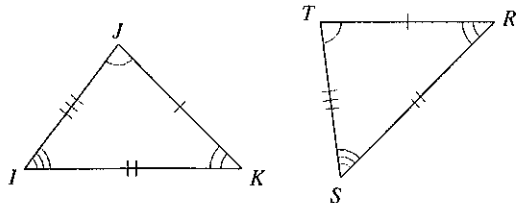
6) $\triangle DEF \cong \triangle DSR$



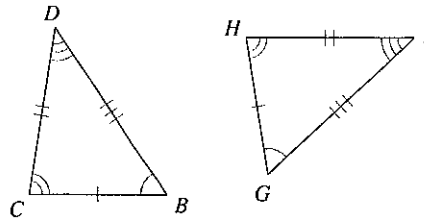
$\angle F \cong ?$

Write a statement that indicates that the triangles in each pair are congruent.

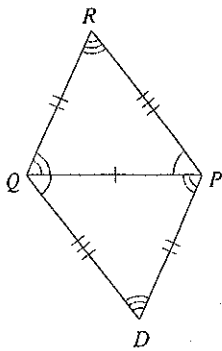
7)



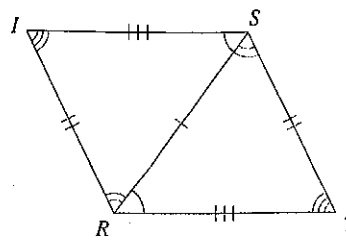
8)



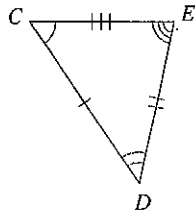
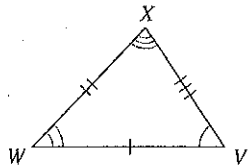
9)



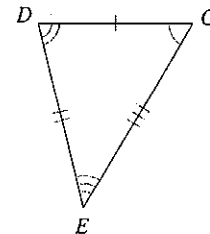
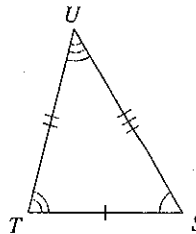
10)



11)

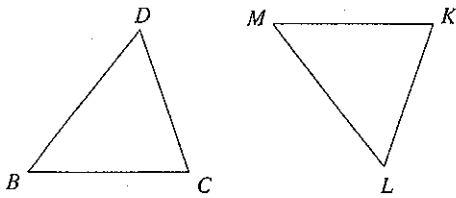


12)

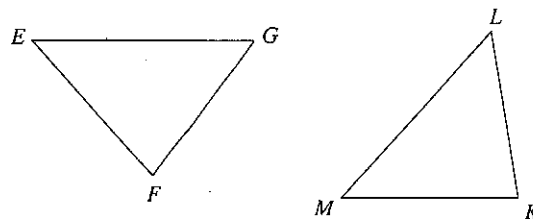


Mark the angles and sides of each pair of triangles to indicate that they are congruent.

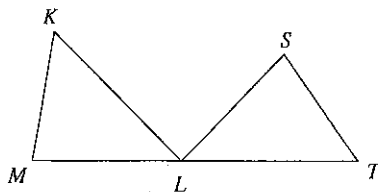
13) $\triangle BDC \cong \triangle MLK$



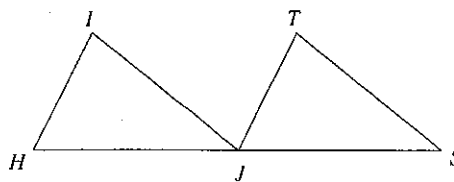
14) $\triangle GFE \cong \triangle LKM$



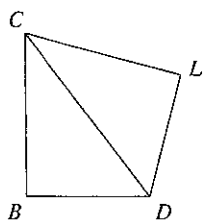
15) $\triangle MKL \cong \triangle STL$



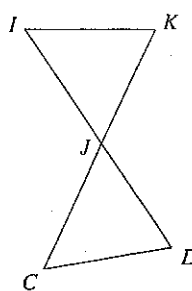
16) $\triangle HIJ \cong \triangle JTS$



17) $\triangle CDB \cong \triangle CDL$



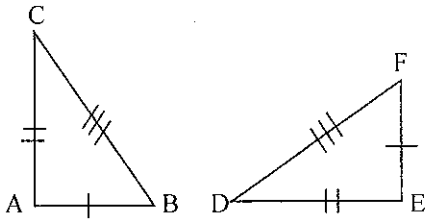
18) $\triangle JIK \cong \triangle JCD$



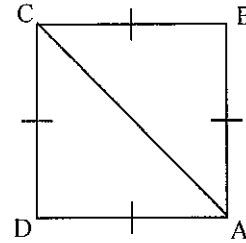
Triangle Congruence Worksheet #1

For each pair of triangles, tell which postulates, if any, make the triangles congruent.

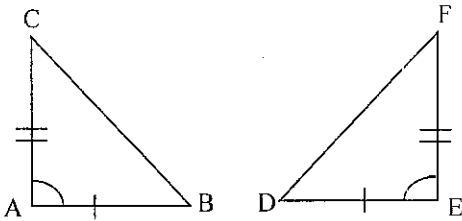
12. $\triangle ABC \cong \triangle EFD$ _____



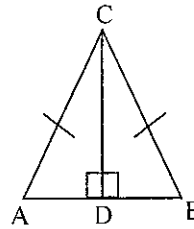
13. $\triangle ABC \cong \triangle CDA$ _____



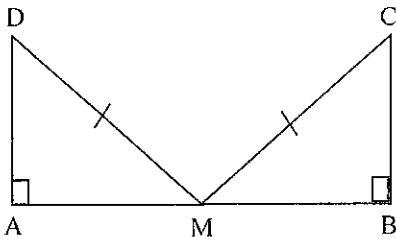
14. $\triangle ABC \cong \triangle EFD$ _____



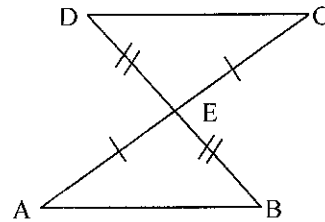
15. $\triangle ADC \cong \triangle BDC$ _____



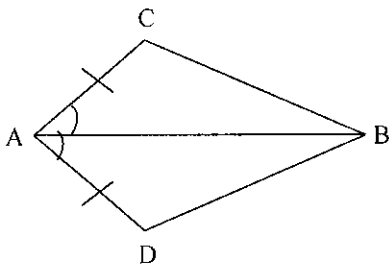
21. $\triangle MAD \cong \triangle MBC$ _____



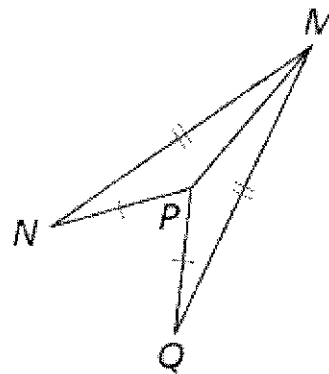
$\triangle ABE \cong \triangle CDE$ _____



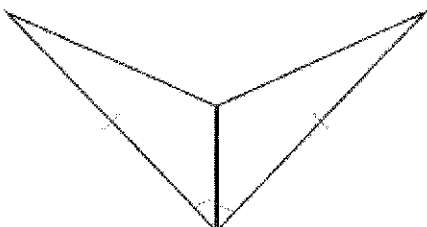
23. $\triangle ACB \cong \triangle ADB$ _____



23. $\triangle MNP \cong \triangle MQP$ _____



23. _____



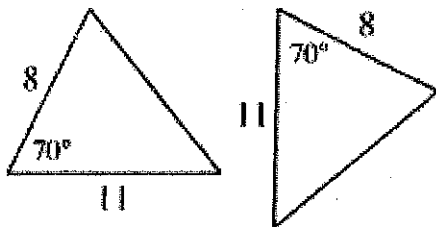
Congruent Triangles WS 1

Name: _____

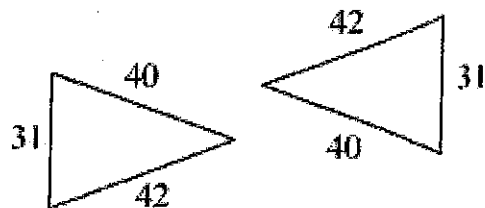
Use your triangle congruence conjectures to determine if the following pairs of triangles must be congruent.

Note: The Diagrams are not necessarily drawn to scale.

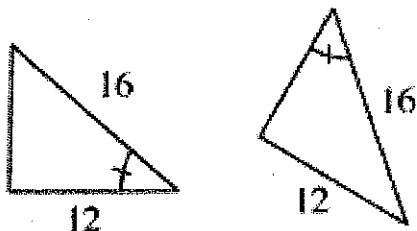
a.



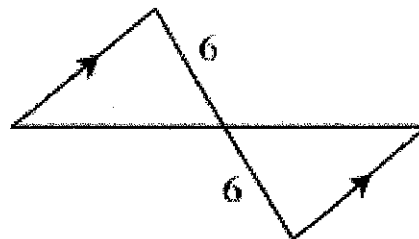
b.



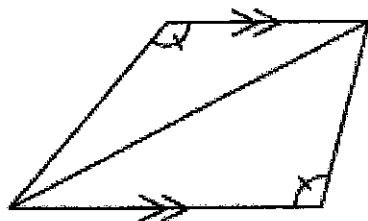
c.



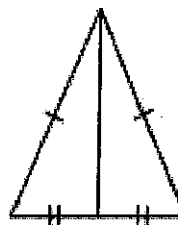
d.



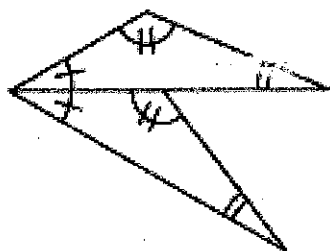
e.



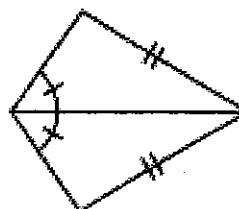
f.



g.

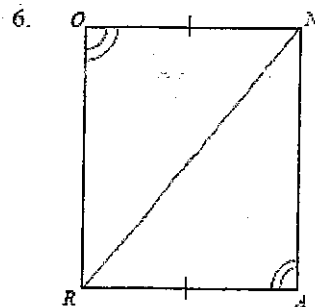
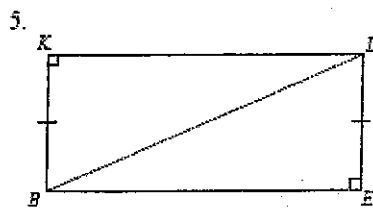
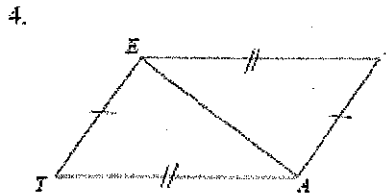
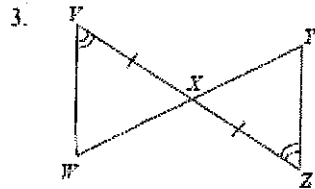
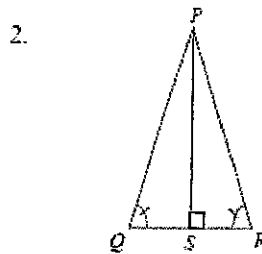
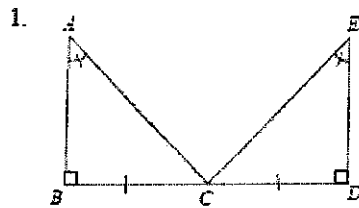
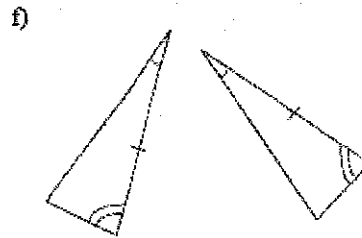
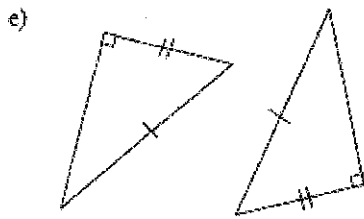
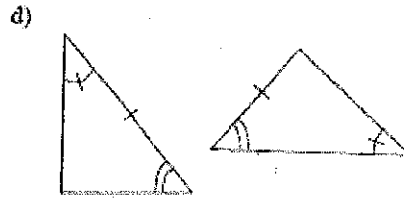
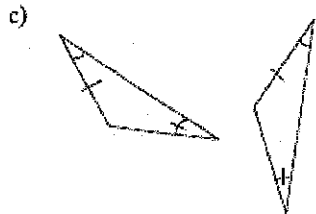
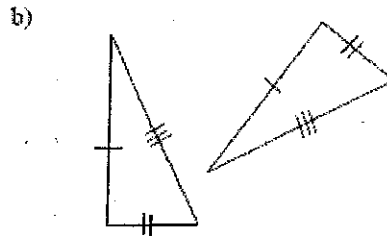
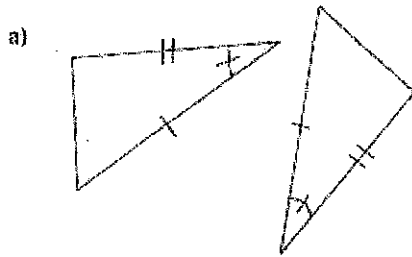


h.



List your Five Triangle Congruence Shortcuts:

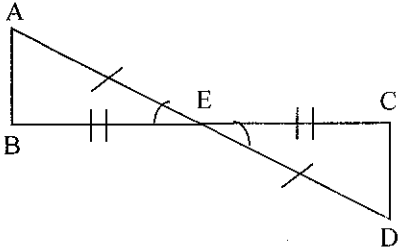
Using your congruence shortcuts, decide if the triangles are congruent. Write the shortcut you used.



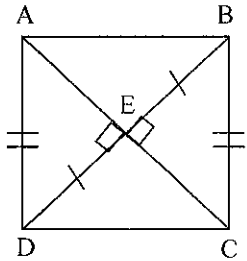
Triangle Congruence Worksheet #2

I. For each pair of triangles, tell which postulate, if any, can be used to prove the triangles congruent.

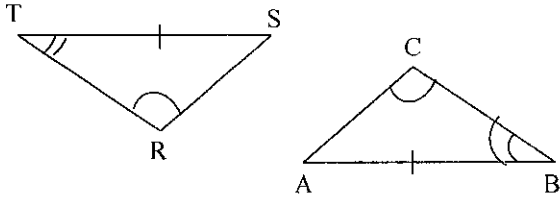
1. $\triangle AEB \cong \triangle DEC$ _____



3. $\triangle DEA \cong \triangle BEC$ _____

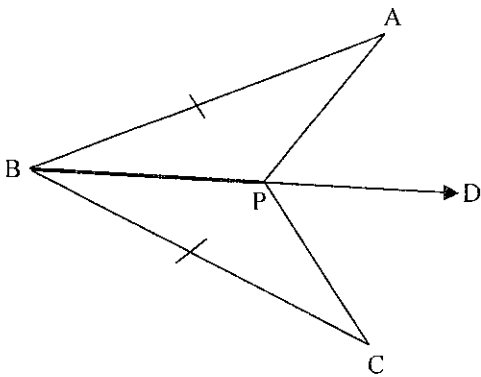


5. $\triangle RTS \cong \triangle CBA$ _____

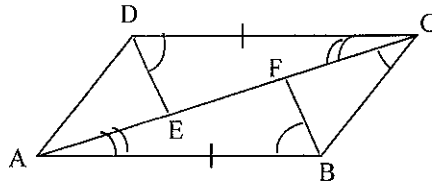


7. $\triangle BAP \cong \triangle BCP$ _____

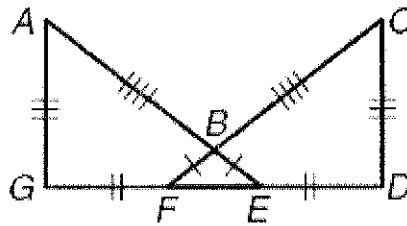
Given: \overrightarrow{BD} bisects $\angle ABC$



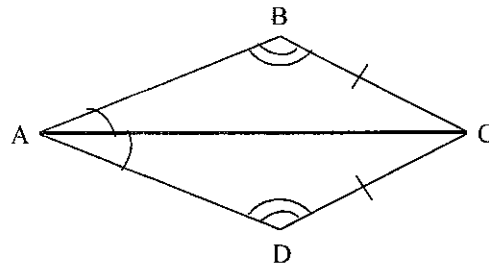
2. $\triangle CDE \cong \triangle ABF$ _____



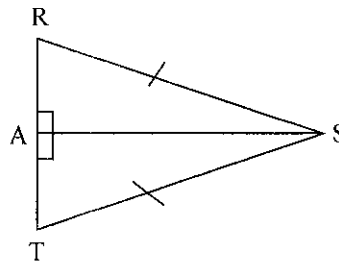
4. $\triangle AGE \cong \triangle CDF$ _____



6. $\triangle ABC \cong \triangle ADC$ _____



8. $\triangle SAT \cong \triangle SAR$ _____



Congruent W.S. #3

Kuta Software - Infinite Geometry

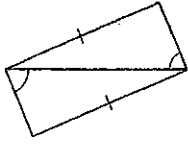
Name _____

SSS, SAS, ASA, and AAS Congruence

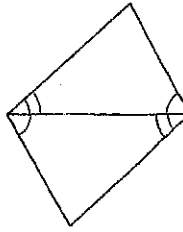
Date _____ Period _____

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

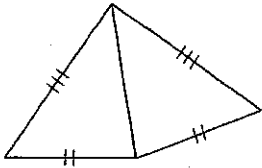
1)



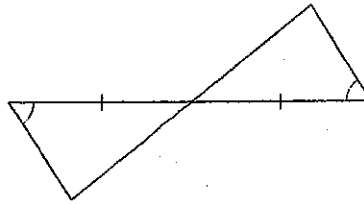
2)



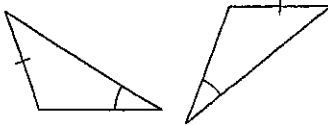
3)



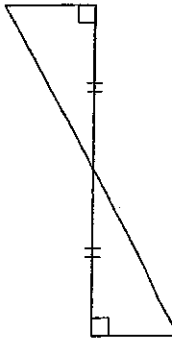
4)



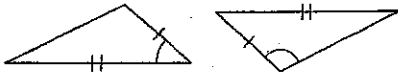
5)



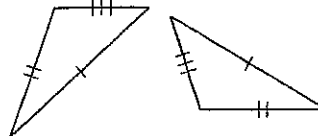
6)



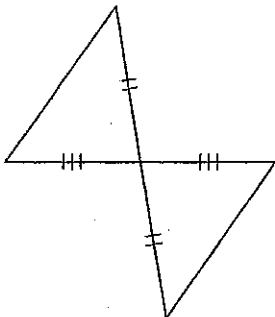
7)



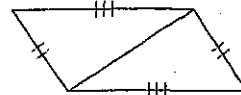
8)



9)



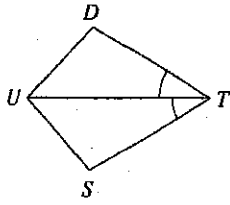
10)



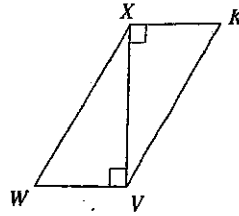
9

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

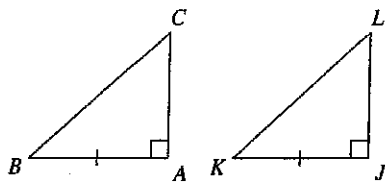
11) ASA



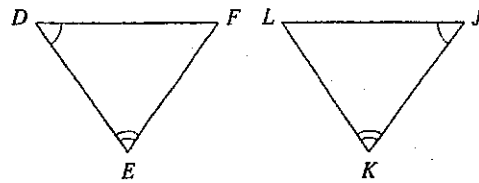
12) SAS



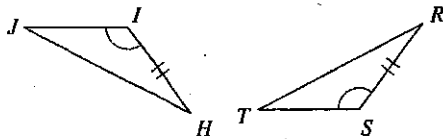
13) SAS



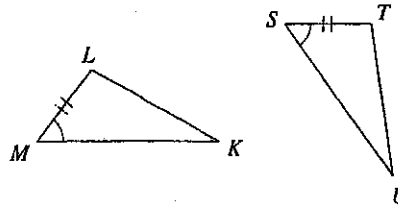
14) ASA



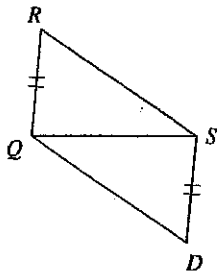
15) SAS



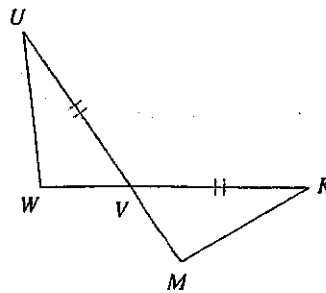
16) ASA



17) SSS



18) SAS



10

Congruent triangle w.s. # 4

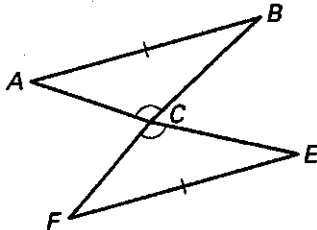
LESSON
4.4

Practice C
For use with pages 240–247

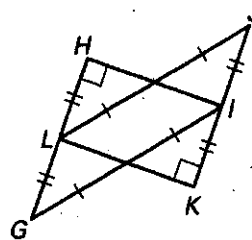
LESSON 4.4

Decide whether enough information is given to prove that the triangles are congruent. If there is enough information, state the congruence postulate or theorem you would use.

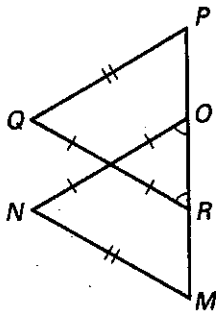
1. $\triangle ABC, \triangle FEC$



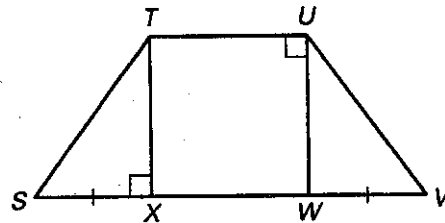
2. $\triangle GHI, \triangle JKL$



3. $\triangle MNO, \triangle PQR$



4. $\triangle STX, \triangle VUW$

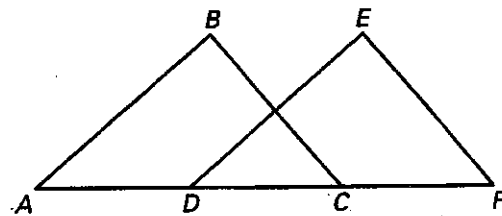


State the third congruence that must be given to prove that $\triangle ABC \cong \triangle FED$ using the indicated postulate or theorem.

5. GIVEN: $\overline{BC} \cong \overline{ED}, \overline{AC} \cong \overline{FD}, \underline{\quad} \cong \underline{\quad}$
Use the SAS Congruence Postulate.

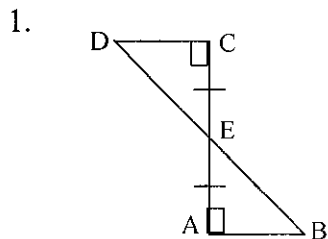
6. GIVEN: $\overline{AB} \cong \overline{FE}, \overline{AC} \cong \overline{FD}, \underline{\quad} \cong \underline{\quad}$
Use the SSS Congruence Postulate.

7. GIVEN: $\overline{BC} \cong \overline{ED}, \angle B$ is a right angle and $\angle B \cong \angle E, \underline{\quad} \cong \underline{\quad}$
Use the HL Congruence Theorem.

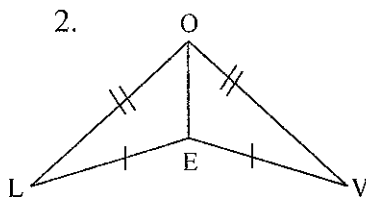


8. Suppose P is the midpoint of \overline{OQ} in $\triangle OQS$. If $\overline{SP} \perp \overline{OQ}$, explain why $\triangle SPO \cong \triangle SPQ$.

II. For each pair of triangles, tell: (a) Are they congruent (b) Write the triangle congruency statement. (c) Give the postulate that makes them congruent.

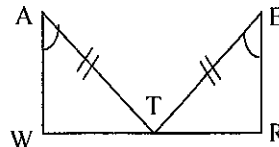


- a. _____
 b. Δ _____ \cong Δ _____
 c. _____

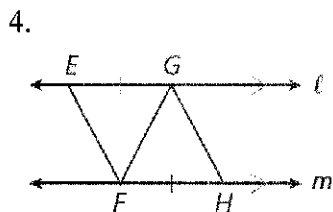


- a. _____
 b. Δ _____ \cong Δ _____
 c. _____

3. Given: T is the midpoint of \overline{WR}

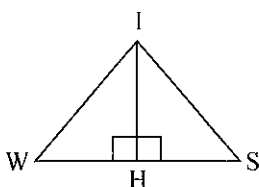


- a. _____
 b. Δ _____ \cong Δ _____
 c. _____

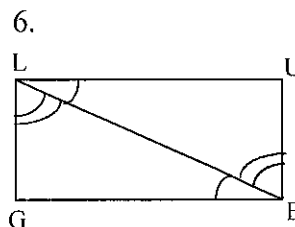


- a. _____
 b. Δ _____ \cong Δ _____
 c. _____

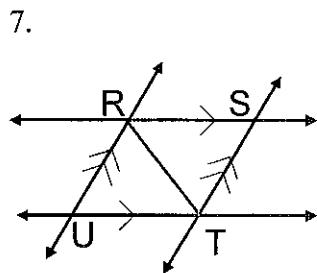
5. Given: \overrightarrow{IH} Bisects $\angle WIS$



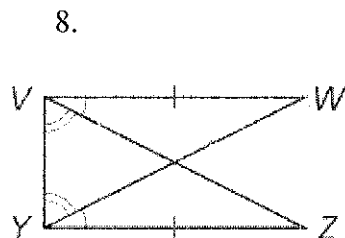
- a. _____
 b. Δ _____ \cong Δ _____
 c. _____



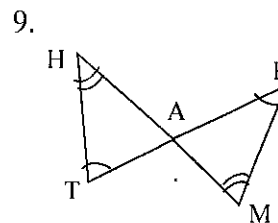
- a. _____
 b. Δ _____ \cong Δ _____
 c. _____



- a. _____
 b. Δ _____ \cong Δ _____
 c. _____

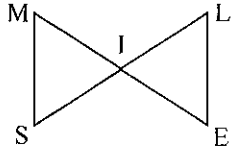


- a. _____
 b. Δ _____ \cong Δ _____
 c. _____



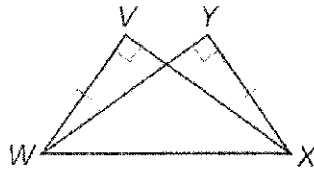
- a. _____
 b. Δ _____ \cong Δ _____
 c. _____

10. Given: I is the midpoint
of \overline{ME} and \overline{SL}



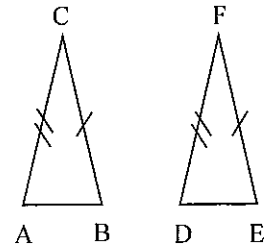
- a. _____
 b. Δ _____ \cong Δ _____
 c. _____

11.



- a. _____
 b. Δ _____ \cong Δ _____
 c. _____

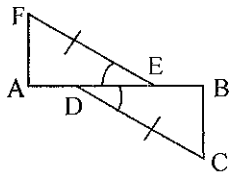
12.



- a. _____
 b. Δ _____ \cong Δ _____
 c. _____

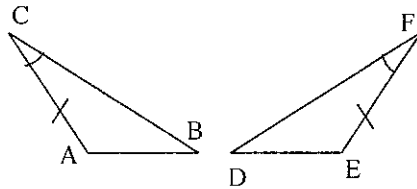
III. Using the given postulate, tell which parts of the pair of triangles should be shown congruent.

1. SAS



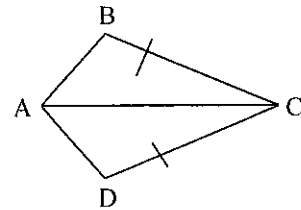
_____ \cong _____

2. ASA



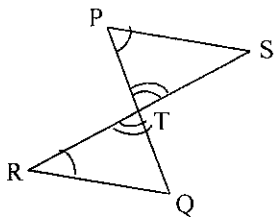
_____ \cong _____

3. SSS



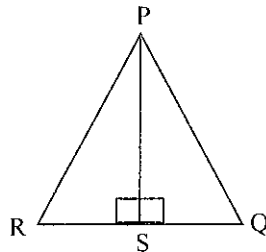
_____ \cong _____

4. AAS



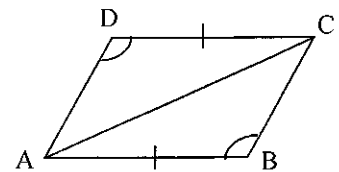
_____ \cong _____

5. HL



_____ \cong _____

6. ASA



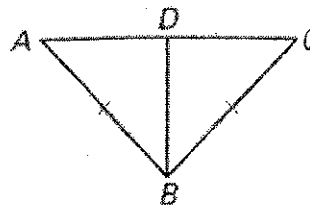
_____ \cong _____

Proof #1

Proof Copy and complete the proof.

GIVEN: $\overline{AB} \cong \overline{CB}$, D is the midpoint of \overline{AC} .

PROVE: $\triangle ABD \cong \triangle CBD$



Statements	Reasons
1. $\overline{AB} \cong \overline{CB}$	1. ?
2. D is the midpoint of \overline{AC} .	2. ?
3. $\overline{AD} \cong \overline{CD}$	3. ?
4. $\overline{BD} \cong \overline{BD}$	4. ?
5. $\triangle ABD \cong \triangle CBD$	5. ?

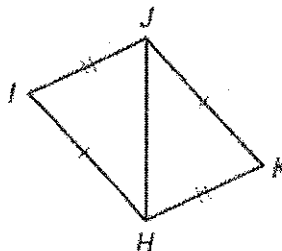
Jan 25-3:29 PM

Proof #2

Proof Copy and complete the proof.

GIVEN: $\overline{HI} \cong \overline{JK}$,
 $\overline{IJ} \cong \overline{KH}$

PROVE: $\triangle HIJ \cong \triangle JKH$



Statements	Reasons
1. ?	1. Given
2. ?	2. Given
3. ?	3. Reflexive Property of Congruence
4. ?	4. SSS Congruence Postulate

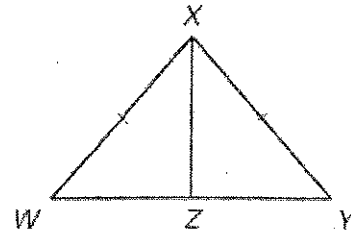
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Proof #3

Proof Copy and complete the proof.

GIVEN: $\overline{WX} \cong \overline{YX}$,
 Z is the midpoint of \overline{WY} .

PROVE: $\triangle WXZ \cong \triangle YXZ$



Statements	Reasons
1. <u> ?</u>	1. Given
2. <u> ?</u>	2. Given
3. <u> ?</u>	3. Definition of Midpoint
4. <u> ?</u>	4. Reflexive Property of Congruence
5. <u> ?</u>	5. SSS Congruence Postulate

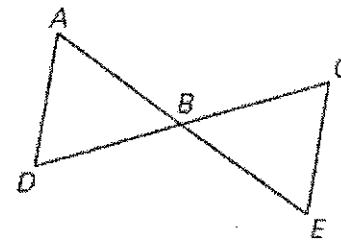
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Proof #4

Proof Copy and complete the proof.

GIVEN: B is the midpoint of \overline{AE} .
 B is the midpoint of \overline{CD} .

PROVE: $\triangle ABD \cong \triangle EBC$



Statements	Reasons
1. B is the midpoint of \overline{AE} .	1. <u> ?</u>
2. <u> ?</u>	2. Definition of midpoint
3. B is the midpoint of \overline{CD} .	3. <u> ?</u>
4. <u> ?</u>	4. Definition of midpoint
5. $\angle ABD \cong \angle EBC$	5. <u> ?</u>
6. $\triangle ABD \cong \triangle EBC$	6. <u> ?</u>

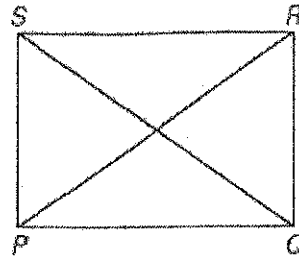
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Proof #5

Proof Copy and complete the proof.

GIVEN: $\overline{QS} \cong \overline{PR}$, $\overline{PS} \perp \overline{RS}$, $\overline{QR} \perp \overline{RS}$

PROVE: $\triangle PRS \cong \triangle QSR$



Statements	Reasons
1. $\overline{QS} \cong \overline{PR}$	1. Given
2. $\overline{PS} \perp \overline{RS}$, $\overline{QR} \perp \overline{RS}$	2. Given
3. $\angle S$ and $\angle R$ are right angles.	3. ?
4. ?	4. Definition of a right triangle
5. $\overline{RS} \cong \overline{SR}$	5. ?
6. $\triangle PRS \cong \triangle QSR$	6. ?

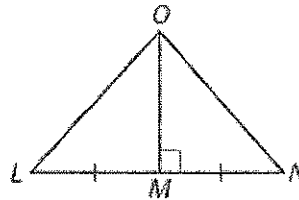
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Proof #6

Proof Copy and complete the proof.

GIVEN: $\overline{OM} \perp \overline{LN}$, $\overline{ML} \cong \overline{MN}$

PROVE: $\triangle OML \cong \triangle OMN$



Statements	Reasons
1. $\overline{OM} \perp \overline{LN}$	1. Given
2. ?	2. If 2 angles are \perp , then they form 4 right \triangle .
3. ?	3. Right Angle Congruence Theorem
4. $\overline{ML} \cong \overline{MN}$	4. ?
5. $\overline{OM} \cong \overline{OM}$	5. ?
6. $\triangle OML \cong \triangle OMN$	6. ?

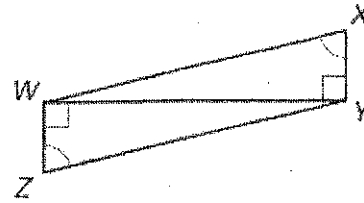
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Proof #7

Proof Copy and complete the proof.

GIVEN: $\angle XYW \cong \angle ZWY$,
 $\angle WXY \cong \angle YZW$

PROVE: $\triangle XYW \cong \triangle ZWY$



Statements	Reasons
1. $\angle XYW \cong \angle ZWY$	1. <u>?</u>
2. $\angle WXY \cong \angle YZW$	2. <u>?</u>
3. $\overline{WY} \cong \overline{WY}$	3. <u>?</u>
4. $\triangle XYW \cong \triangle ZWY$	4. <u>?</u>

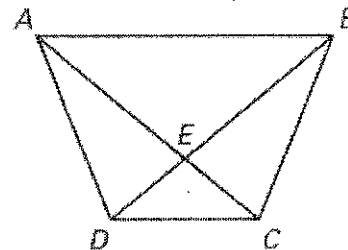
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Proof #8

Proof Copy and complete the proof.

GIVEN: $\overline{DE} \cong \overline{CE}$, $\angle ADE \cong \angle BCE$

PROVE: $\triangle AED \cong \triangle BEC$



Statements	Reasons
1. $\overline{DE} \cong \overline{CE}$	1. <u>?</u>
2. $\angle ADE \cong \angle BCE$	2. <u>?</u>
3. $\angle AED \cong \angle BEC$	3. <u>?</u>
4. $\triangle AED \cong \triangle BEC$	4. <u>?</u>

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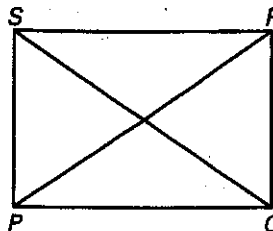
LESSON
4.4

Practice C *continued*
For use with pages 240-247

9. **Proof** Complete the proof.

GIVEN: $\overline{QS} \cong \overline{PR}$, $\overline{PS} \perp \overline{RS}$, $\overline{QR} \perp \overline{RS}$

PROVE: $\triangle PRS \cong \triangle QSR$



Statements

Reasons

1. $\overline{QS} \cong \overline{PR}$

1. Given

2. $\overline{PS} \perp \overline{RS}$, $\overline{QR} \perp \overline{RS}$

2. Given

3. $\angle S$ and $\angle R$ are right angles.

3. ?

4. ?

4. Definition of a right triangle

5. $\overline{RS} \cong \overline{SR}$

5. ?

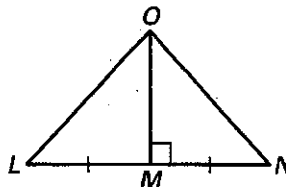
6. $\triangle PRS \cong \triangle QSR$

6. ?

10. **Proof** Complete the proof.

GIVEN: $\overline{OM} \perp \overline{LN}$, $\overline{ML} \cong \overline{MN}$

PROVE: $\triangle OML \cong \triangle OMN$



Statements

Reasons

1. $\overline{OM} \perp \overline{LN}$

1. Given

2. ?

2. If 2 angles are \perp , then they form 4 right \angle s.

3. ?

3. Right Angle Congruence Theorem

4. $\overline{ML} \cong \overline{MN}$

4. ?

5. $\overline{OM} \cong \overline{OM}$

5. ?

6. $\triangle OML \cong \triangle OMN$

6. ?

Midsegments of Triangles

1. Draw a scalene triangle, named $\triangle ABC$.
(Label the base \overline{AC} , and make it have a whole-number length.)

2. Find the midpoints of \overline{AB} and \overline{BC} (by folding).

3. Connect these two midpoints.

** This segment is called a MIDSEGMENT. **

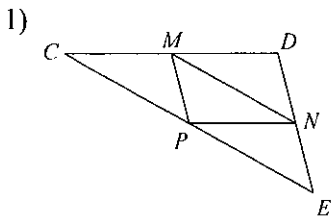
4. What appears to be true about the midsegment and \overline{AC} ?

5. Measure the lengths of the midsegment and \overline{AC} .

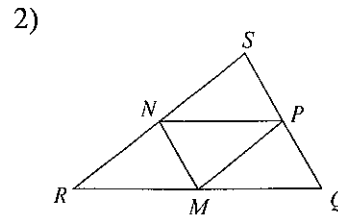
6. What do you notice about their measures?

Midsegment of a Triangle

In each triangle, M, N, and P are the midpoints of the sides. Name a segment parallel to the one given.



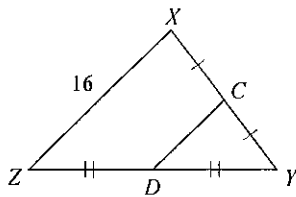
$\overline{CD} \parallel \underline{\hspace{1cm}}$



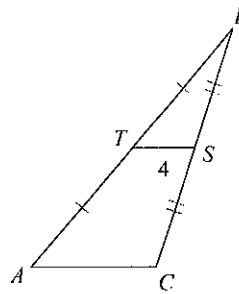
$\underline{\hspace{1cm}} \parallel \overline{QS}$

Find the missing length indicated.

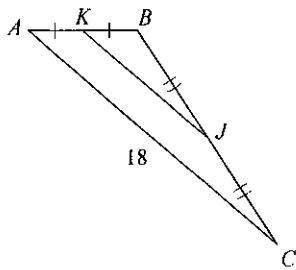
3) Find CD



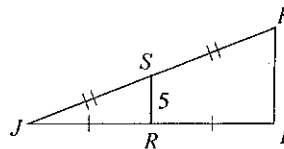
4) Find AC



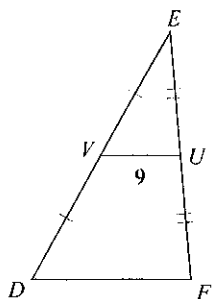
5) Find KJ



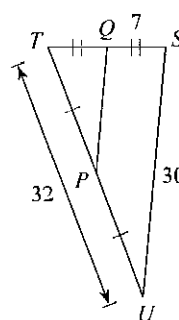
6) Find IK



7) Find DF

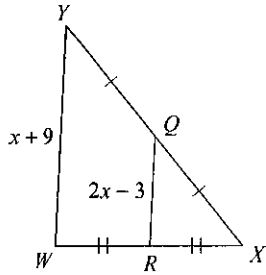


8) Find PQ

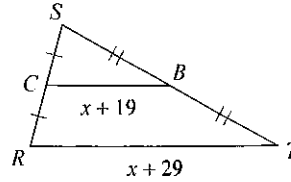


Solve for x .

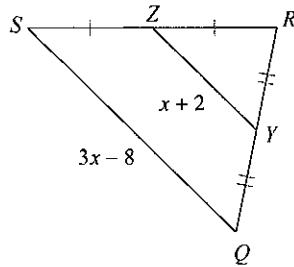
9)



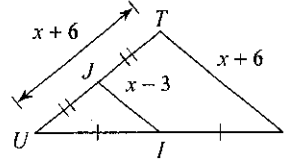
10)



11)

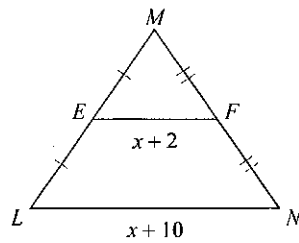


12)

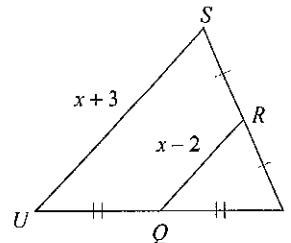


Find the missing length indicated.

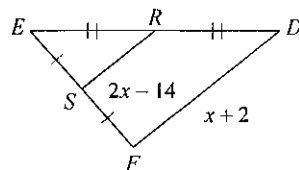
13) Find LN



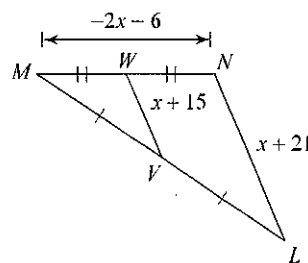
14) Find RQ



15) Find SR



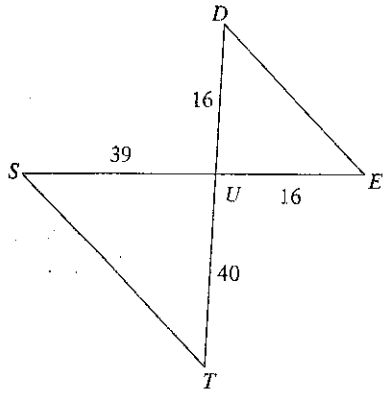
16) Find VW



Similar Triangles

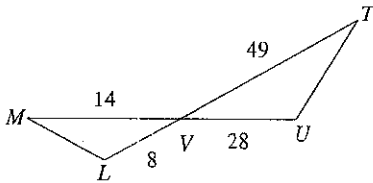
State if the triangles in each pair are similar. If so, state how you know they are similar and complete the similarity statement.

1)



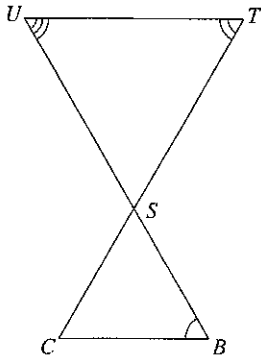
$\triangle UTS \sim$ _____

3)



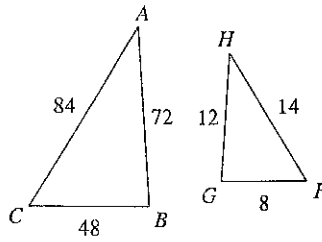
$\triangle VUT \sim$ _____

5)



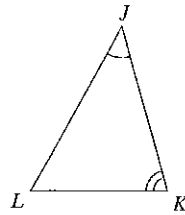
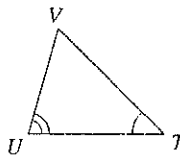
$\triangle STU \sim$ _____

2)



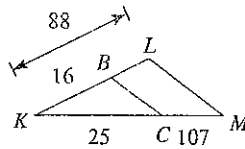
$\triangle CBA \sim$ _____

4)



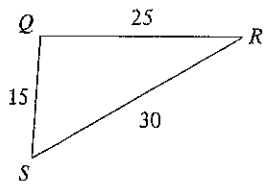
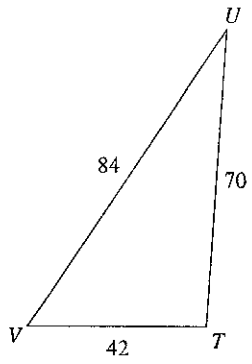
$\triangle JKL \sim$ _____

6)



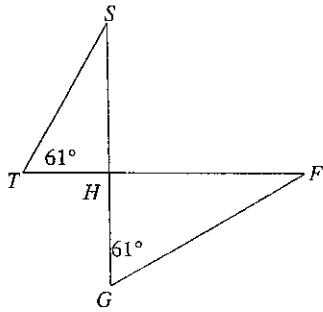
$\triangle KLM \sim$ _____

7)



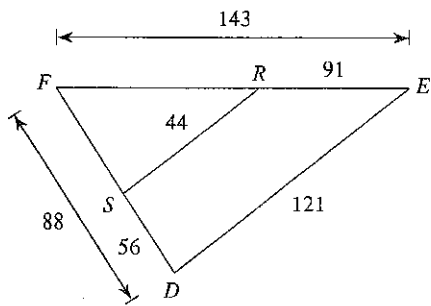
$\Delta TUV \sim$ _____

9)



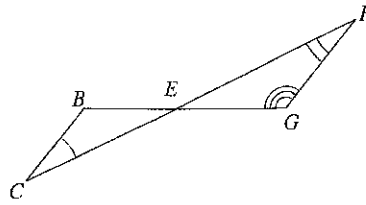
$\Delta HGF \sim$ _____

11)



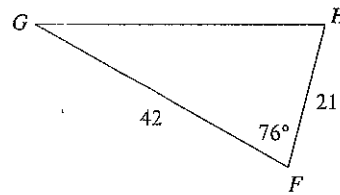
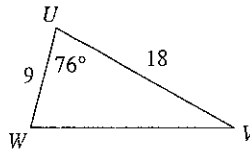
$\Delta FED \sim$ _____

8)



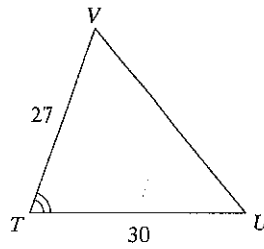
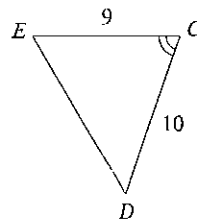
$\Delta EFG \sim$ _____

10)



$\Delta FGH \sim$ _____

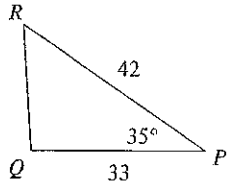
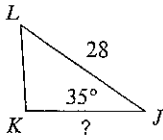
12)



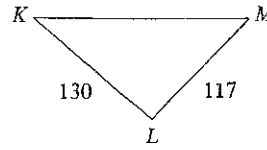
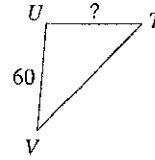
$\Delta TUV \sim$ _____

Find the missing length. The triangles in each pair are similar.

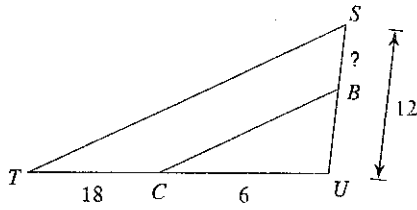
13)



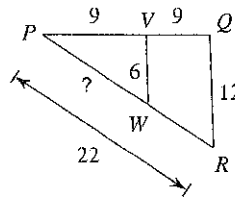
14)



15)

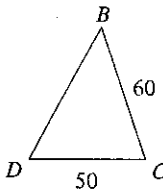
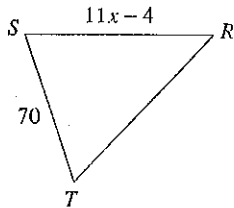


16)

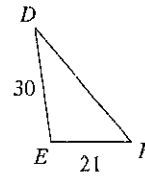
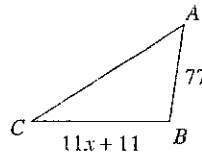


Solve for x . The triangles in each pair are similar.

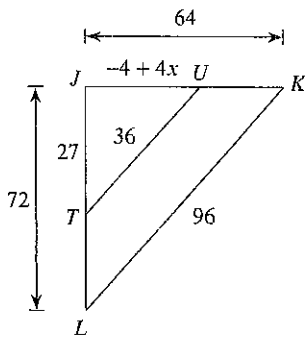
17)



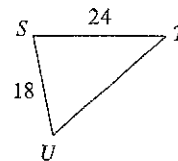
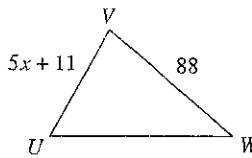
18)



19)



20)

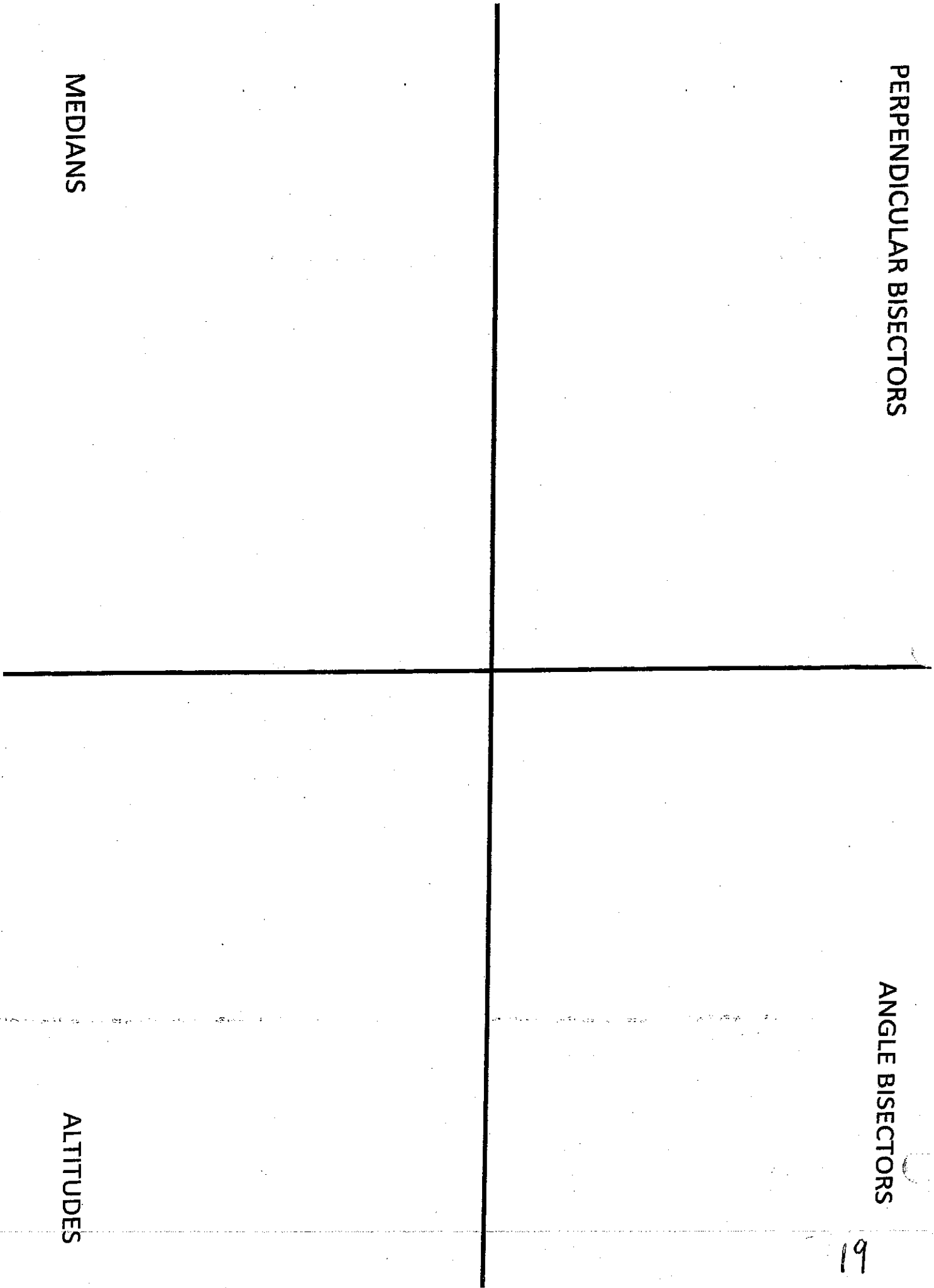


PERPENDICULAR BISECTORS

ANGLE BISECTORS

MEDIANS

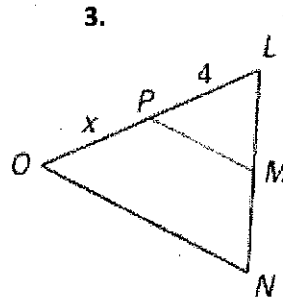
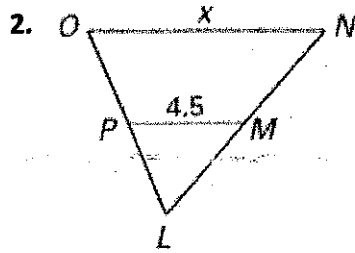
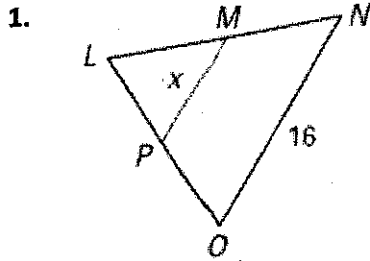
ALTITUDES



Points of Concurrency in Triangles

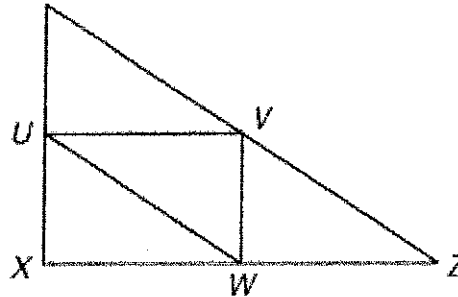
	Description	Point of Concurrency	Special Properties
Perpendicular Bisectors			
Angle Bisectors			
Medians			
Altitudes			

\overline{MP} is a midsegment of $\triangle LNO$. Find the value of x .



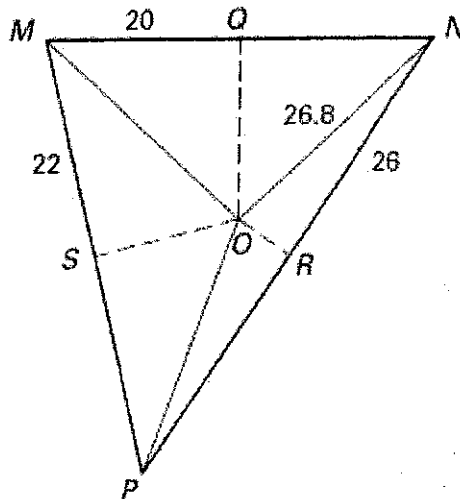
Use the diagram of $\triangle XYZ$ where U , V , and W are the midpoints of the sides.

4. If $UW = 4x - 1$ and $YZ = 5x + 4$, what is UW ?



In the diagram, the perpendicular bisectors of $\triangle MNP$ meet at point O and are shown dashed. Find the indicated measure.

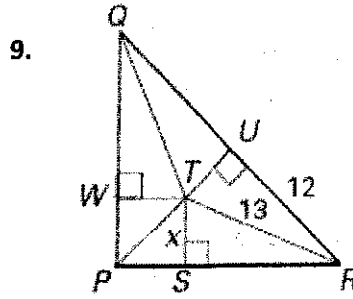
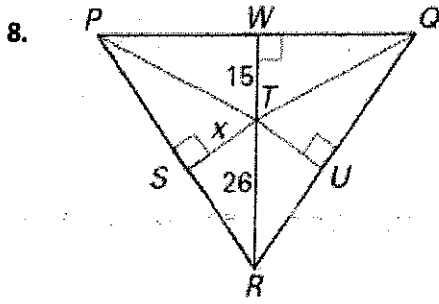
5. Find MO .



6. Find PR .

7. Find MN .

T is the incenter of $\triangle PQR$. Find the value of x .



S is the centroid of $\triangle RTW$, $RS = 4$, $VW = 6$, and $TV = 9$. Find

10. \overline{RV}

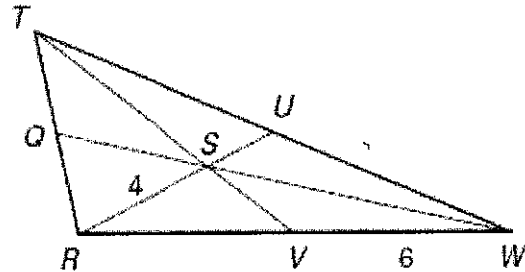
11. \overline{SU}

12. \overline{RU}

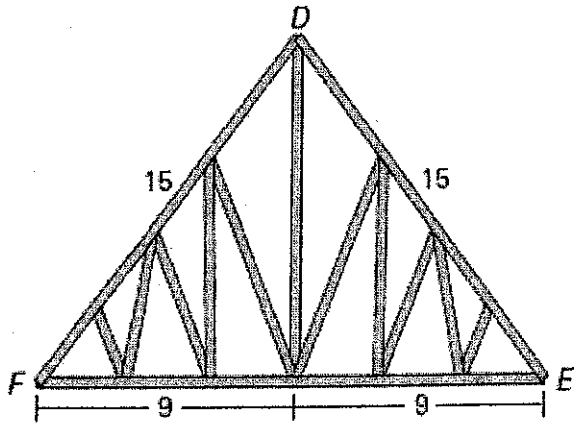
13. \overline{RW}

14. \overline{TS}

15. \overline{SV}



Roof Trusses Some roofs are built using several triangular wooden trusses.



16. Find the altitude (height) of the truss.

17. How far down from D is the centroid of $\triangle DEF$?

Centers of Triangles Practice Worksheet

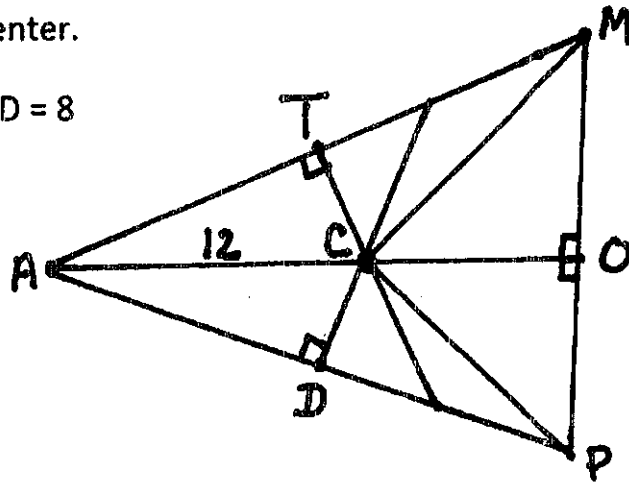
Name _____ Class Period _____

1. **C** is a circumcenter.

$AC = 12$ $AD = 8$

$MP = 14$

$TM = 10$



Find:

$AT =$ _____

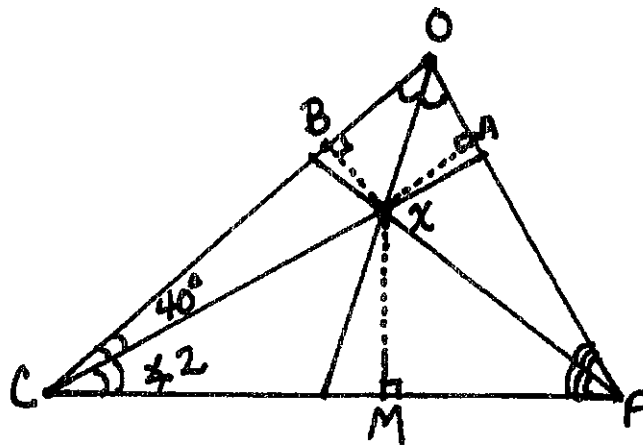
$CM =$ _____

$DP =$ _____

2. **X** is an incenter.

$BX = 6$

$m\angle CPO = 52^\circ$



Find:

$XM =$ _____

$m\angle 2 =$ _____

$m\angle BOX =$ _____

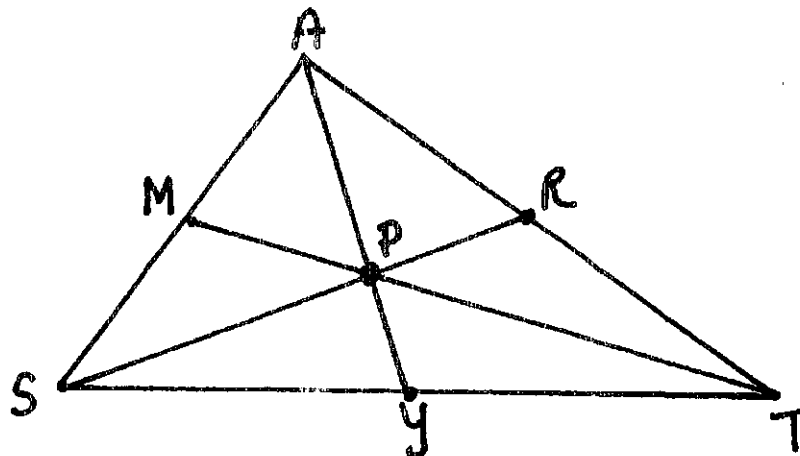
3. **P** is a centroid.

$PR = 12$

$PT = 8$

$AR = 9$

$AY = 21$



Find:

$SP =$ _____

$TM =$ _____

$AT =$ _____

$PY =$ _____

9. Point G is the Centroid of $\triangle ABC$. $AD = 8$, $AG = 10$, and $CD = 18$. Find the length of the given segment.

\overline{BD} _____

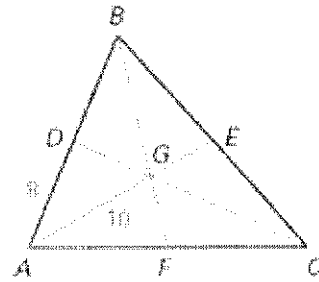
\overline{AE} _____

\overline{AB} _____

\overline{CG} _____

\overline{EG} _____

\overline{DG} _____



D is the centroid of $\triangle ABC$, $\overline{AE} = 12$, $\overline{AD} = 10$, $\overline{CF} = 12$. Find the length of each segment.

10.

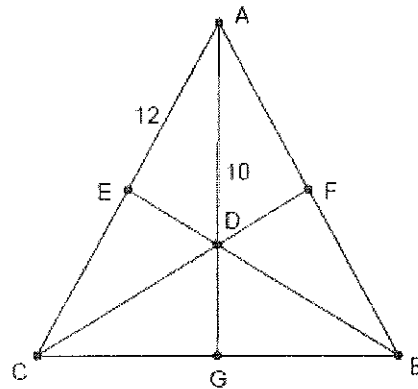
\overline{DG} _____

\overline{AG} _____

\overline{EC} _____

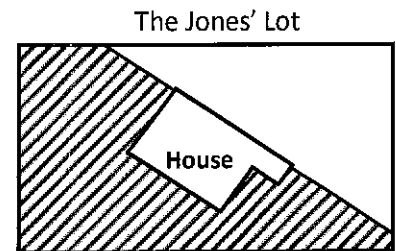
\overline{AC} _____

\overline{DF} _____

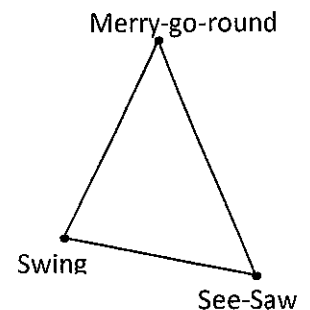


State a point of concurrency that would help solve each of the problems below. Then state how you would find that point of concurrency.

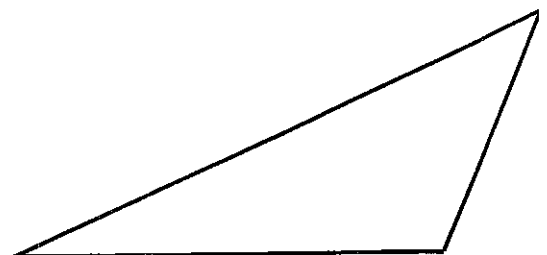
11. This rectangle represents the Jones' lot. The non-shaded triangular region represents their backyard. The Jones' want to build the largest possible circular pool in their backyard, how would you determine the location of the pool's center?



12. The Smith Construction Company has been hired to install a new water fountain at WinstonianPark. They would like to find the best location for the fountain so that the walking distance from each of the three main pieces of playground equipment is the same. How would they determine this point?



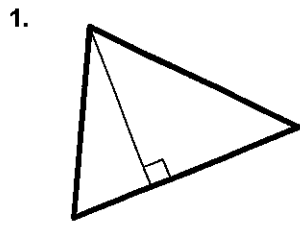
13. You are a sculptor and have just completed a large metal mobile. You want to hang this mobile, made of a flat triangular metal plate, in the State Capitol. This triangular piece will hang so that it will be suspended with the triangular surface parallel to the ground. How would you locate the point where the mobile will balance?



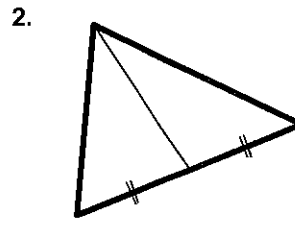
Name: _____

Geometry – Points of Concurrency Worksheet

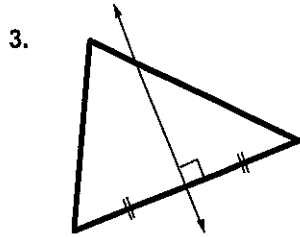
Circle the letter with the name of the segment/line/ray shown.



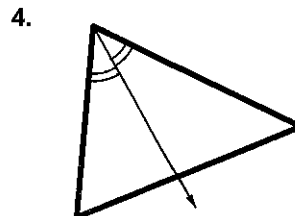
- (a) perpendicular bisector
- (b) angle bisector
- (c) median
- (d) altitude



- (a) perpendicular bisector
- (b) angle bisector
- (c) median
- (d) altitude



- (a) perpendicular bisector
- (b) angle bisector
- (c) median
- (d) altitude



- (a) perpendicular bisector
- (b) angle bisector
- (c) median
- (d) altitude

Circle the letter with the name of the correct point of concurrency.

5. The three altitudes of a triangle intersect at the _____.

- (a) circumcenter
- (b) incenter
- (c) centroid
- (d) orthocenter

6. The three medians of a triangle intersect at the _____.

- (a) circumcenter
- (b) incenter
- (c) centroid
- (d) orthocenter

7. The three perpendicular bisectors of a triangle intersect at the _____.

- (a) circumcenter
- (b) incenter
- (c) centroid
- (d) orthocenter

8. The three angle bisectors of a triangle intersect at the _____.

- (a) circumcenter
- (b) incenter
- (c) centroid
- (d) orthocenter

9. It is equidistant from the three vertices of the triangle.

- (a) circumcenter
- (b) incenter
- (c) centroid
- (d) orthocenter

10. It is equidistant from the three sides of the triangle.

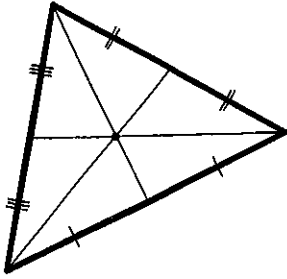
- (a) circumcenter
- (b) incenter
- (c) centroid
- (d) orthocenter

11. It divides each median into two sections at a 2:1 ratio.

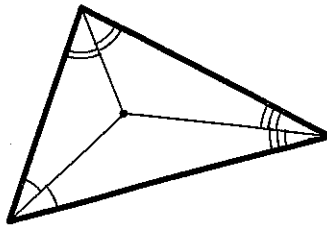
- (a) circumcenter
- (b) incenter
- (c) centroid
- (d) orthocenter

Name the point of concurrency shown.

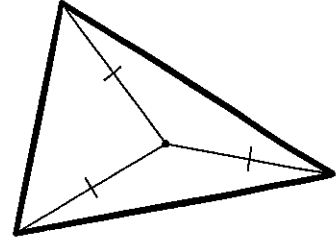
12.



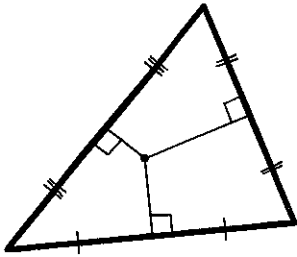
13.



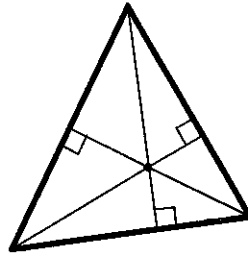
14.



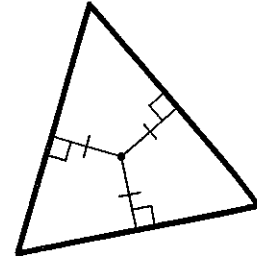
15.



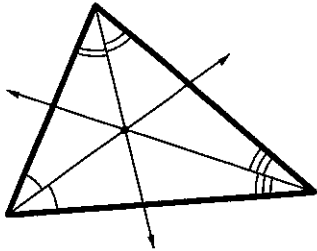
16.



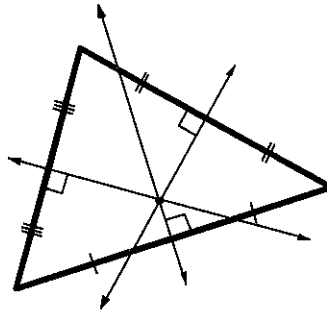
17.



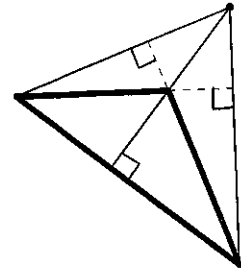
18.



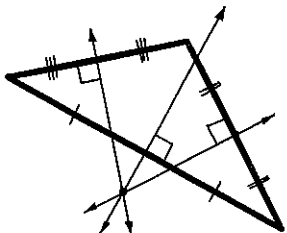
19.



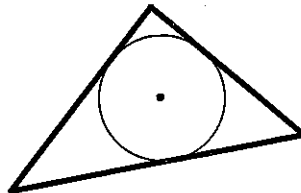
20.



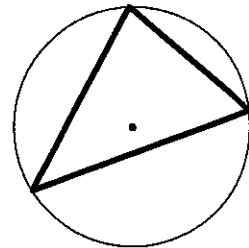
21.



22.

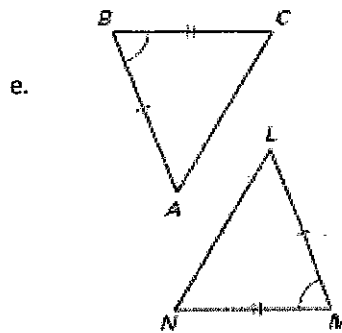
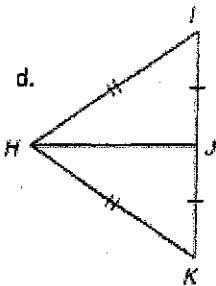
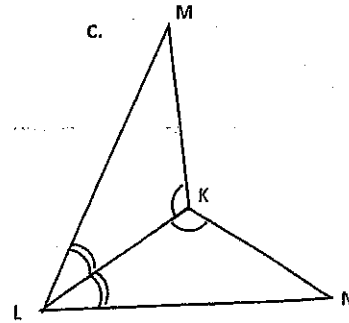
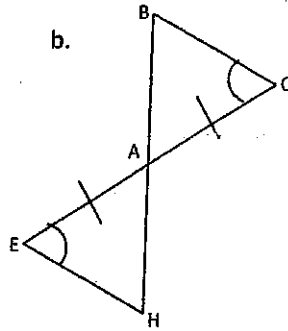
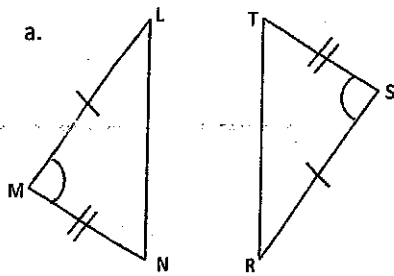


23.



Congruent Triangles

1. Name the congruent triangles shown in the diagrams and state the postulate or theorem you would use.

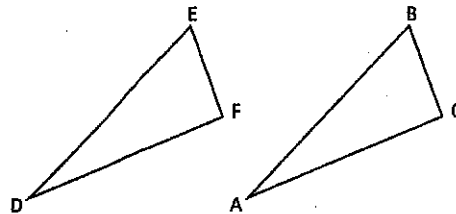


2. State the third congruence that is needed to prove that $\triangle ABC \cong \triangle DEF$.

a. GIVEN: $\overline{DE} \cong \overline{AB}$, $\angle D \cong \angle A$
USE: AAS Congruence

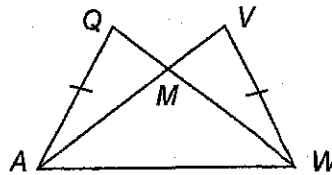
b. GIVEN: $\overline{DE} \cong \overline{AB}$, $\angle D \cong \angle A$
USE: SAS Congruence

c. GIVEN: $\overline{DE} \cong \overline{AB}$, $\angle D \cong \angle A$
USE: ASA Congruence



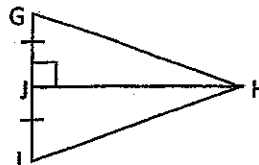
3. Given $\angle Q \cong \angle V$ and the figure shown, which statement is NOT necessarily true?

- a. $\triangle QAM \cong \triangle VWM$
- b. $\triangle QWA \cong \triangle VAW$
- c. $\triangle QAM \cong \triangle VMW$
- d. $\triangle WAM$ is isosceles



4. Complete the congruence statement $\triangle GJH \cong$ ___ by ___.

- a. $\triangle GJH \cong \triangle IJH$ by HL
- b. $\triangle GJH \cong \triangle IHJ$ by HL
- c. $\triangle GJH \cong \triangle IJH$ by SAS
- d. $\triangle GJH \cong \triangle IHJ$ by SAS



Points of Concurrency

5. Define each and name the point of concurrency found by each:

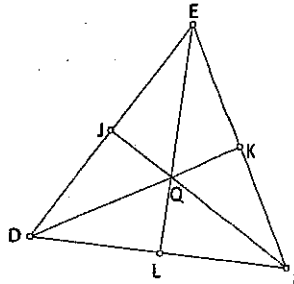
- a. Altitudes:
- b. Medians:
- c. Perpendicular Bisectors
- d. Angles Bisectors:

6. Which points of concurrency may lie outside the triangle? Which are always inside the triangle?

7. By the Concurrency of Perpendicular Bisectors

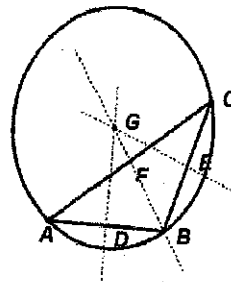
Theorem, if \overline{QJ} , \overline{QK} , and \overline{QL} are perpendicular bisectors, then ?. (multiple choice)

- a. $\angle JQK \cong \angle KQL \cong \angle LQJ$
- b. $DE = EF = FD$
- c. $QD = QE = QF$
- d. $\angle EQK \cong \angle FQL \cong \angle DQJ$

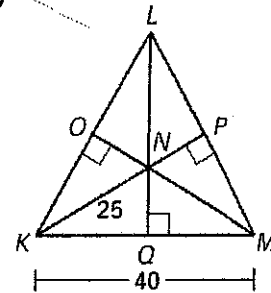


8. In the diagram, \overline{GE} , \overline{GD} and \overline{GF} are perpendicular bisectors of the sides of the triangle. G is the _____ of the triangle.

- a. circumcenter
- b. incenter
- c. orthocenter
- d. centroid
- e. center

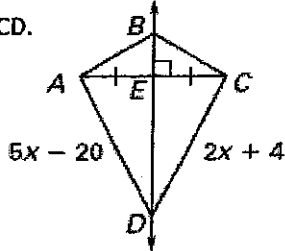


9. In the diagram at the right, the angle bisectors of $\triangle KLM$ meet at point N. Q is the midpoint of \overline{KM} . Find NP.

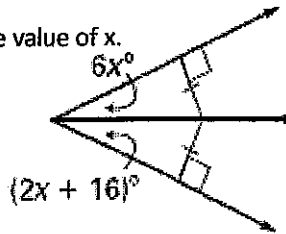


10. Find each missing value.

a. Find CD.



b. Find the value of x.



11. Explain each theorem in your own words, using diagrams.

- a. Midsegment Theorem
- b. Perpendicular Bisector Theorem
- c. Concurrency of Perpendicular Bisectors Theorem
- d. Angle Bisector Theorem
- e. Concurrency of Angle Bisectors Theorem
- f. Concurrency of Medians Theorem

5. Can you give a reasonable guess as to why the specific names were given to each point of concurrency?
6. Which triangle center did you recommend for the location of the amusement park?
7. The president of the company building the park is concerned about the cost of building roads from the towns to the park. What recommendation would you give him? Write a memo to the president explaining your recommendation.

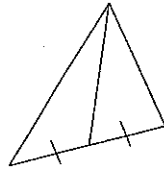
Practice:

- _____ 1. Which points of concurrency may lie outside the triangle?
 - a. orthocenter and the circumcenter
 - b. circumcenter and incenter
 - c. centroid and incenter
 - d. centroid and orthocenter
- _____ 2. Which point of concurrency is the balancing point of the triangle?
 - a. incenter
 - b. orthocenter
 - c. centroid
 - d. circumcenter
- _____ 3. Which point of concurrency is $\frac{2}{3}$ the distance from the vertex to the side?
 - a. incenter
 - b. orthocenter
 - c. centroid
 - d. circumcenter
- _____ 4. Which point of concurrency is equidistant from the sides of the triangle?
 - a. incenter
 - b. orthocenter
 - c. centroid
 - d. circumcenter
- _____ 5. Which point of concurrency is equidistant from the vertices of the triangle?
 - a. incenter
 - b. orthocenter
 - c. centroid
 - d. circumcenter

Matching (3 points each)

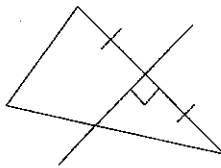
_____ 6. altitude

a.



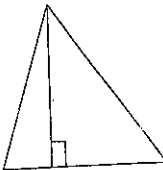
_____ 7. angle bisector

b.



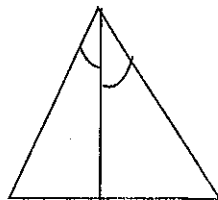
_____ 8. median

c.



_____ 9. Perpendicular bisector

d.



Matching

__10. Centroid

a. altitude

__11. Incenter

b. angle bisector

__12. Orthocenter

c. median

__13. Circumcenter

d. perpendicular bisector