Name ANSWERS Period____ Date________

**Geometry 21: Review for Quiz on 4.1-4.4**

State each of the following:

1. SAS theorem- If 2 sides of one $\Delta$ are $\cong$ to 2 corresponding sides on another $\Delta$, and their included $\angle$ is $\cong$, then the $\Delta$'s are $\cong$

2. Right angles theorem

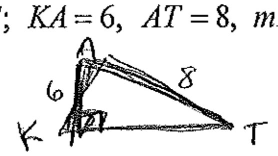
   All right $\angle$'s are $\cong$

Use the congruence statement $FAITH \cong LUKEC$ to complete the following:

3. $\angle A \cong \angle U$
4. $\overline{EK} \cong \overline{TI}$
5. $\angle AFH \cong \angle ULC$

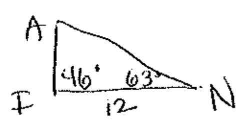
For each triangle described below, if another triangle is drawn with the same corresponding information, would the 2 triangles be GUARANTEED to be congruent? In other words, is the given information enough to determine a unique triangle? If yes, state the theorem or postulate to support your answer.

6. In $\triangle KAT$; $KA = 6$, $AT = 8$, $m\angle K = 90°$



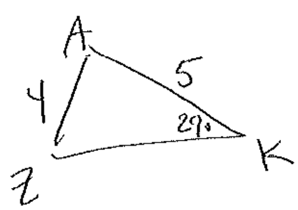

yes, HL

7. In $\triangle IAN$; $m\angle I = 46°$, $m\angle N = 63°$, $IN = 12$




yes, ASA

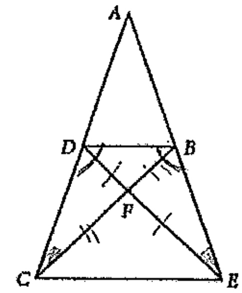
8. In $\triangle ZAK$; $AZ = 4$, $AK = 5$, $m\angle K = 29°$




No, SSA not a postulate

Using the diagram below (not drawn to scale) and given the following information, which two triangles are congruent? Briefly explain your answer and give the theorem or postulate that proves the congruence. (Don't do a proof, just briefly explain).

9. $F$ is the midpoint of $\overline{DE}$ and $\overline{BC}$




$\Delta DFC \cong \Delta BFE$

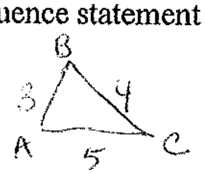
Vertical ∡s and SAS

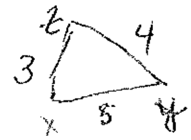
10. $\angle CDB \cong \angle EBD$, $\angle DEB \cong \angle BCD$

$\Delta BDC \cong \Delta DBE$

$\overline{DB} \cong \overline{DB}$ reflexive , then AAS

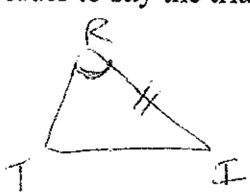
11. In $\triangle ABC$, $AB=3$, $BC=4$, and $AC=5$. In $\triangle XYZ$, $XY=5$, $YZ=4$, and $XZ=3$. Write a congruence statement for the triangles.




$\Delta ABC \cong \Delta XZY$

12. In $\triangle TRI$ *and* $\triangle NGL$, $\overline{RI} \cong \overline{GN}$ *and* $\angle G \cong \angle R$, what other information would you need in order to say the triangles were congruent by AAS?

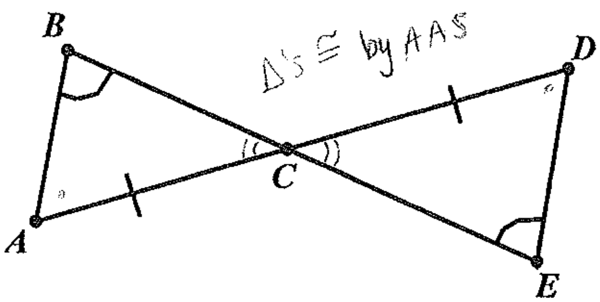




$\angle I \cong \angle L$

13. solve for x if m<A = $5x^2 - 3$, and m<D = $3x^2 - x$

Δ's ≅ by AAS




m<A = m<D (corresp. pts. ≅ Δ's ≅)

$5x^2 - 3 = 3x^2 - x$

$-3x^2 \quad -3x^2 + x$

$2x^2 + x - 3 = 0$

$(2x+3)(x-1) = 0$

| | | |
|---|---|---|
| -1 | -2x | -3 |
| x | $2x^2$ | 3x |
| | 2x | 3 |

$-6x^2$ ; 3x ; -2x ; x

$2x + 3 = 0$ $\quad$ $x - 1 = 0$

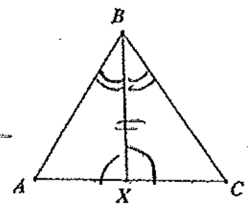
$2x = -3$

$(x = -3/2)$ $\quad$ $\boxed{x=1}$

Name______________________________ Period_____ Date________

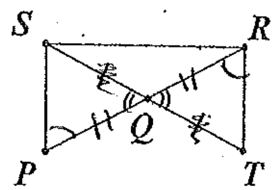
**Geometry 21: LOTS of practice with Triangle Congruence Proofs!!! ☺**

1. Given: $\angle AXB \cong \angle CXB, \angle ABX \cong \angle CBX$
Prove: $\overline{AB} \cong \overline{CB}$



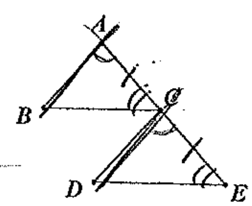

| S | R |
|---|---|
| 1) $\angle AXB \cong \angle CXB$, $\angle ABX \cong \angle CBX$ | 1) Given |
| 2) $\overline{BX} \cong \overline{BX}$ | 2) Reflexive |
| 3) $\triangle AXB \cong \triangle CXB$ | 3) ASA |
| 4) $\overline{AB} \cong \overline{CB}$ | 4) Corresp. parts $\cong \triangle$'s $\cong$ |

2. Given: $Q$ is the midpoint of $\overline{PR}$, $\angle P \cong \angle QRT$
Prove: Q is the midpoint of $\overline{ST}$

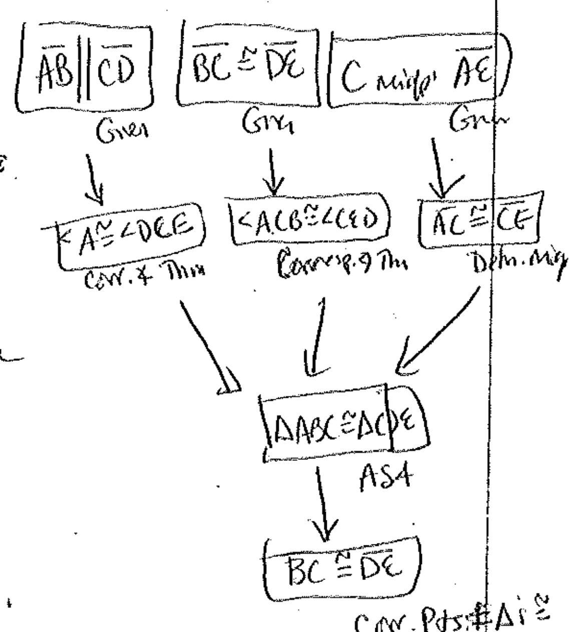



| S | R |
|---|---|
| 1) Q is midpt. of $\overline{PR}$ | 1) Given |
| 2) $\overline{PQ} \cong \overline{RQ}$ | 2) Defn. midpt. |
| 3) $\angle P \cong \angle QRT$ | 3) Given |
| 4) $\angle SQP \cong \angle TQR$ | 4) Vertical $\angle$'s Thm |
| 5) $\triangle SQP \cong \triangle TQR$ | 5) ASA |
| 6) $\overline{SQ} \cong \overline{TQ}$ | 6) Corresp. parts $\cong \triangle$'s $\cong$ |
| 7) Q is midpt. $\overline{ST}$ | 7) Defn. midpt. |

3. Given: $\overline{AB} \parallel \overline{CD}, \overline{BC} \parallel \overline{DE}, C$ is the midpoint of $\overline{AE}$
Prove: $\overline{BC} \cong \overline{DE}$

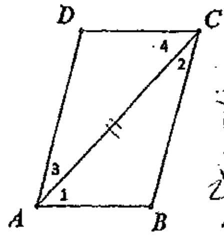



| S | R |
|---|---|
| 1) $\overline{AB} \parallel \overline{CD}$ | 1) Given |
| 2) $\angle A \cong \angle DCE$ | 2) Corresponding $\angle$'s Thm |
| 3) $\overline{BC} \parallel \overline{DE}$ | 3) Given |
| 4) $\angle ACB \cong \angle CED$ | 4) Corresponding $\angle$'s Thm |
| 5) C is midpt. of $\overline{AE}$ | 5) Given |
| 6) $\overline{AC} \cong \overline{CE}$ | 6) Defn. midpt. |
| 7) $\triangle ABC \cong \triangle CDE$ | 7) ASA |
| 8) $\overline{BC} \cong \overline{DE}$ | 8) Corresp parts $\cong \triangle$'s $\cong$. |



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

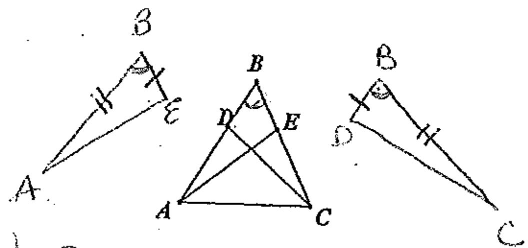
Prove: $\overline{AB} \cong \overline{CD}$




| S | R |
|---|---|
| 1) $\angle 1 \cong \angle 4$, $\angle 2 \cong \angle 3$ | 1) Given |
| 2) $\overline{AC} \cong \angle\overline{CA}$ | 2) Reflexive |
| 3) $\Delta ADC \cong \Delta CBA$ | 3) ASA |
| 4) $\overline{AB} \cong \overline{CD}$ | 4) Corr. Pts $\cong \Delta$'s $\cong$ |

5. Given: $\overline{BA} \cong \overline{BC}, \overline{BD} \cong \overline{BE}$

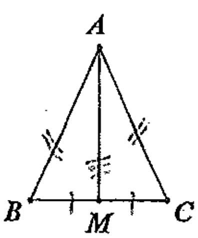
Prove: $\angle BDC \cong \angle BEA$




| S | R |
|---|---|
| 1) $\overline{BA} \cong \overline{BC}$ ; $\overline{BD} \cong \overline{BE}$ | 1) Given |
| 2) $\angle B \cong \angle B$ | 2) Reflexive |
| 3) $\Delta BDC \cong \Delta BEA$ | 3) SAS |
| 4) $\angle BDC \cong \angle BEA$ | 4) Corr. parts $\cong \Delta$'s $\cong$ |

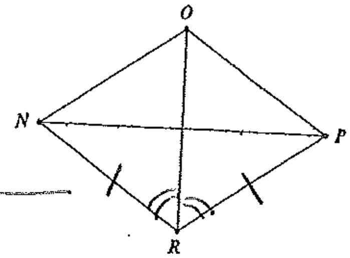
6. Given: $\overline{AB} \cong \overline{AC}, M$ is the midpoint of $\overline{BC}$

Prove: $\overline{AM}$ bisects $\angle BAC$



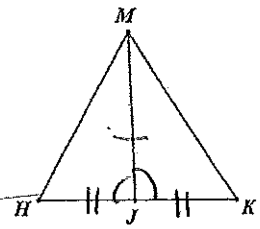

| S | R |
|---|---|
| 1) $\overline{AB} \cong \overline{AC}$ ; M midpt $\overline{BC}$ | 1) Given |
| 2) $\overline{BM} \cong \overline{CM}$ | 2) Defn. midpt. |
| 3) $\overline{AM} \cong \overline{AM}$ | 3) Reflexive |
| 4) $\Delta ABM \cong \Delta ACM$ | 4) SSS |
| 5) $\angle BAM \cong \angle CAM$ | 5) Corr. pts. $\cong \Delta$'s $\cong$ |
| 6) $\overline{AM}$ bisects $\angle BAC$ | 6) Defn. bisector. |

7. Given: $\overline{NR} \cong \overline{PR}, \overline{RO}$ bisects $\angle NRP$
Prove: $\overline{OR}$ bisects $\angle NOP$



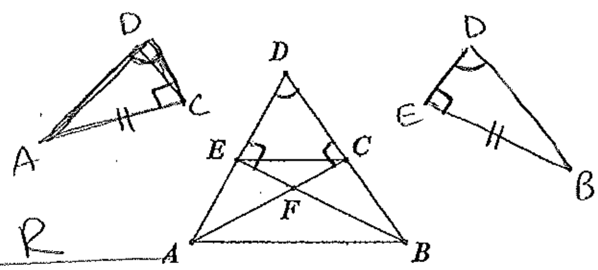

| S | R |
|---|---|
| 1) $\overline{NR} \cong \overline{PR}$ ; $\overline{RO}$ bis. $\angle NRP$ | 1) Given |
| 2) $\angle ORN \cong \angle ORP$ | 2) Defn. bisect. |
| 3) $\overline{OR} \cong \overline{OR}$ | 3) Reflexive |
| 4) $\angle NOR \cong \angle POR$ | 4) ~~Def~~ Corr. $\angle$ Thm |
| 5) $\overline{OR}$ bisects $\angle NOP$ | 5) Defn. bisect. |

8. Given: $\overline{HJ} \cong \overline{KJ}, \angle MJH \cong \angle MJK$
Prove: $\overline{MJ}$ bisects $\angle HMK$



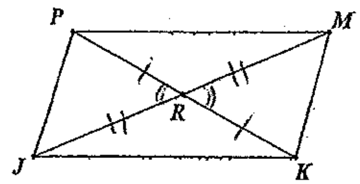

| S | R |
|---|---|
| 1) $\overline{HJ} \cong \overline{KJ}$ ; $\angle MJH \cong \angle MJK$ | 1) Given |
| 2) $\overline{MJ} \cong \overline{MJ}$ | 2) Reflexive |
| 3) $\triangle MJH \cong \triangle MJK$ | 3) SAS |
| 4) $\angle HMJ \cong \angle KMJ$ | 4) Corr. pts. $\cong \triangle$'s $\cong$ |
| 5) $\overline{MJ}$ bisects $\angle HMK$ | 5) Defn bisect. |

9. Given: $\overline{BE} \perp \overline{AD}, \overline{AC} \perp \overline{BD}, \overline{AC} \cong \overline{BE}$
Prove: $\overline{DE} \cong \overline{EC}$



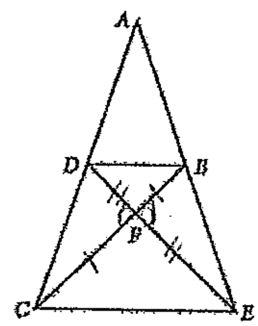

| S | R |
|---|---|
| 1) $\overline{BE} \perp \overline{AD}$ ; $\overline{AC} \perp \overline{BD}$ ; $\overline{AC} \cong \overline{BE}$ | 1) Given |
| 2) $\angle BED$ & $\angle ACD$ are rt. $\angle$'s | 2) Defn. $\perp$ |
| 3) $\angle BED \cong \angle ACD$ | 3) Rt. $\angle$'s Thm |
| 4) $\angle D \cong \angle D$ | 4) Reflexive |
| 5) $\overline{DE} \cong \overline{DC}$ | 5) Corr. pts. $\cong \triangle$'s $\cong$ |

10. Given: $\overline{PK}$ and $\overline{JM}$ bisect each other at $R$
Prove: $\overline{PJ} \cong \overline{MK}$ $\overline{KM}$




| S | R |
|---|---|
| 1) $\overline{PK}$ and $\overline{JM}$ bis. each other at R | 1) Given |
| 2) $\overline{PR} \cong \overline{KR}$ ; $\overline{JR} \cong \overline{MR}$ | 2) Defn. bisect. |
| 3) $\angle PRJ \cong \angle KRM$ | 3) Vertical ∡'s Thm |
| 4) $\triangle PRJ \cong \triangle KRM$ | 4) SAS |
| 5) $\overline{PJ} \cong \overline{KM}$ | 5) Corr. parts $\cong$ △'s $\cong$ |

11. Given: $F$ is the midpoint of $\overline{DE}$ and $\overline{BC}$
Prove: $\overline{DC} \cong \overline{BE}$




| S | R |
|---|---|
| 1) F is midpt. $\overline{DE}$ and $\overline{BC}$ | 1) Given |
| 2) $\overline{DF} \cong \overline{EF}$ ; $\overline{BF} \cong \overline{CF}$ | 2) Defn. midpt. |
| 3) $\angle DFC \cong \angle BFE$ | 3) Vertical ∡'s Thm |
| 4) $\triangle DFC \cong \triangle BFE$ | 4) SAS |
| 5) $\overline{DC} \cong \overline{BE}$ | 5) Corr. parts. $\cong$ △'s $\cong$ |

$\boxed{\text{F is midpt. } \overline{DE} \text{ ; } \overline{BC}}$
Given

$\boxed{\overline{DF} \cong \overline{EF}}$ $\boxed{\overline{BF} \cong \overline{CF}}$
Defn. midpt.

$\boxed{\angle DFC \cong \angle BFE}$
Vertical ∡ Thm

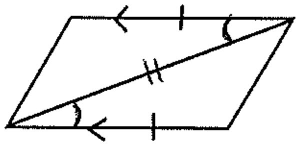
$\boxed{\triangle DFC \cong \triangle BFE}$
SAS

$\boxed{\overline{DC} \cong \overline{BE}}$
Corr. pts. $\cong$ △'s $\cong$

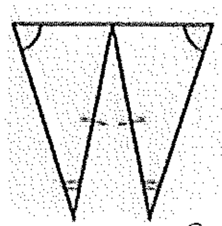
Name______________________________________________Period______Date__________

**Geometry 21: A Little More Practice with Triangle Congruence (4.1-4.4, 4.6)**

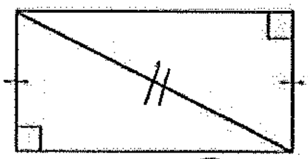
1. State if the following triangles are congruent or not. If so, state the postulate or theorem you used.

a. 

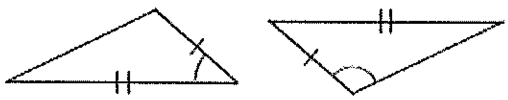
SAS

b. 

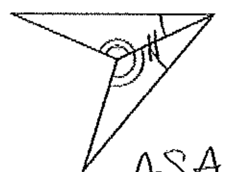
AAS

c. 

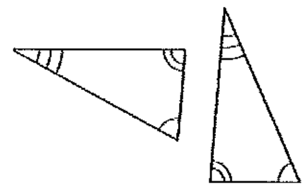
HL

d. 

SAS

e. 

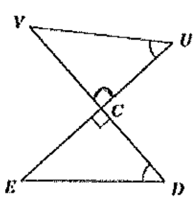
ASA

f. 

Not ≅ (No AAA)

2. Label and state what additional information the triangles need to be congruent for the given reason. Then, complete the triangle congruence statements.

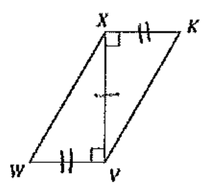
a. **AAS**




$\overline{VU} \cong \overline{ED}$

$\Delta CED \cong \Delta$ CVU

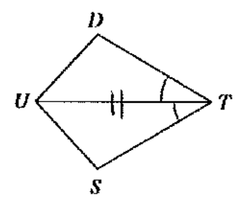
b. **SAS**




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

$\Delta WXV \cong \Delta$ KVX

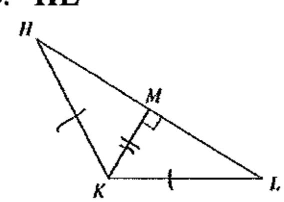
c. **ASA**




$\angle DUT \cong \angle SUT$

$\Delta UDT \cong \Delta$ UST

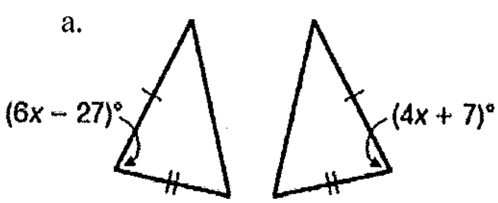
c. **HL**




$\overline{HK} \cong \overline{LK}$

$\Delta HMK \cong \Delta$ LMK

3. Find the value of *x* that makes the triangles congruent.

a. 

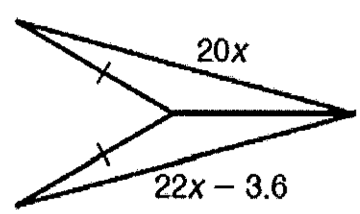

x = 17

$6x - 27 = 4x + 7$

$-4x + 27 \quad -4x + 27$

$2x = 34$

$x = 17$

b. 


x = 1.8

$22x - 3.6 = 20x$

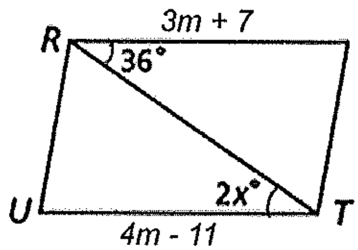
$-22x$

$-3.6 = -2x$

$x = 1.8$

4. Find the values of the missing variables, given the following triangle congruence statements.

a. $\triangle RST \cong \triangle TUR$



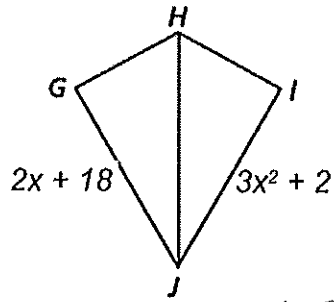

$2x = 36$

$x = 18$

$3m + 7 = 4m - 11$

$18 = m$

b. $\triangle GHJ \cong \triangle IHJ$




$x = 8/3,\ -2$

$\cancel{2x} + \cancel{18} = 3x^2 + 2$

$-\cancel{2x} \quad -\cancel{18} \qquad -18$

$0 = 3x^2 - 2x - 16$

$(3x - 8)(x + 2) = 0$

| | | |
|---|---|---|
| $-8$ | $-8x$ | $-16$ |
| $3x$ | $3x^2$ | $6x$ |
| | $x$ | $2$ |

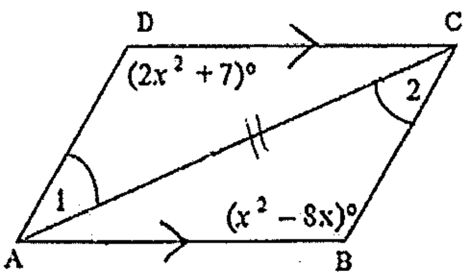
$-48x^2$, $-8x$, $6x$, $-2x$

$3x - 8 = 0 \qquad x + 2 = 0$

$3x = 8$

$x = 8/3 \qquad x = -2$

5. Solve for x.




$2x^2 + 7 = x^2 - 8x$

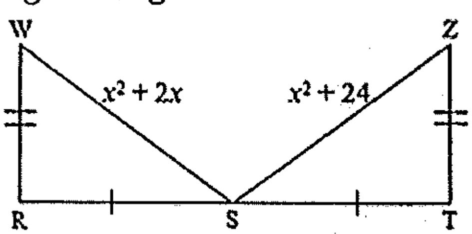
$-x^2 \qquad -x^2$

$x^2 + 8x + 7 = 0$

$(x + 1)(x + 7) = 0$

$x = -1, -7$

6. **For which value(s) of $x$ are the triangles congruent?**

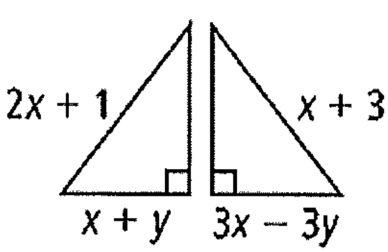



$\cancel{x^2} + 2x = \cancel{x^2} + 24$

$2x = 24$

$x = 12$

7. For what values of x and y are the triangles congruent by HL?




$x + y = 3x - 3y$

$2 + y = 3(2) - 3y$

$2 + y = 6 - 3y$

$-2 + 3y \qquad -2 + 3y$

$4y = 4 \qquad y = 1$

$2x + 1 = x + 3$

$-x \ -1 \quad -x \ -1$

$x = 2$

8. Describe the situation in which "SSA" works. What do we call it?

SSA works if the "A" (angle) is a RIGHT ∡ in a right Δ, and hypotenuses are one "S" and a leg is the other "S"

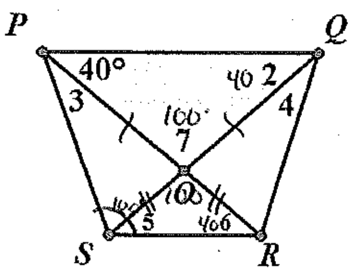
We call it HL

Geometry 21 **Isosceles and Equilateral Triangles** Name ANSWERS per____ date____

Solve for all numbered angles, using the markings in each diagram and any given information.

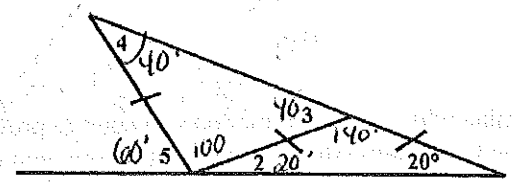
1) $\overline{PO} \cong \overline{QO},\ \overline{RO} \cong \overline{SO}$, $m\angle PSR = 105^\circ$

180 − 145 = 35°



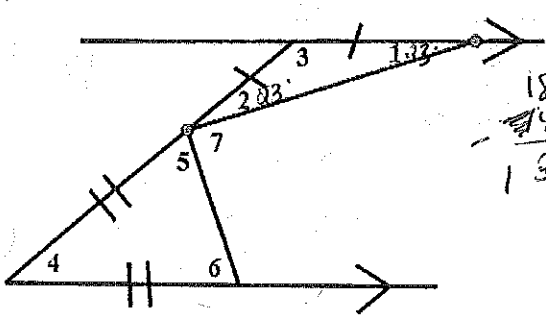

m<2 = 40°; m<7 = 100°; m<5 = 40°
m<3 = 35°; m<4 = 35°; m<6 = 40°

2)




m<2 = 20°; m<3 = 40; m<4 = 40°
m<5 = 60°

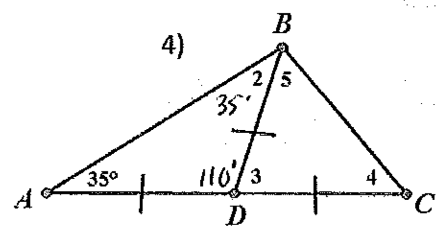
3) $m\angle 1 = 23^\circ$




180 − 146 = 34°

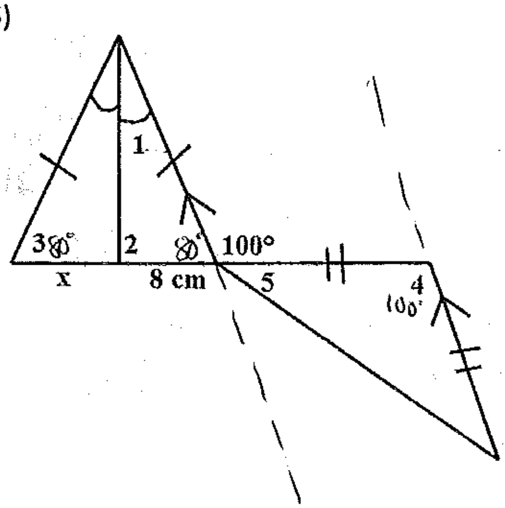
m<1 = 23°; m<2 = 23°; m<3 = 134°
m<4 = 46°; m<5 = 67°; m<6 = 67°

4)



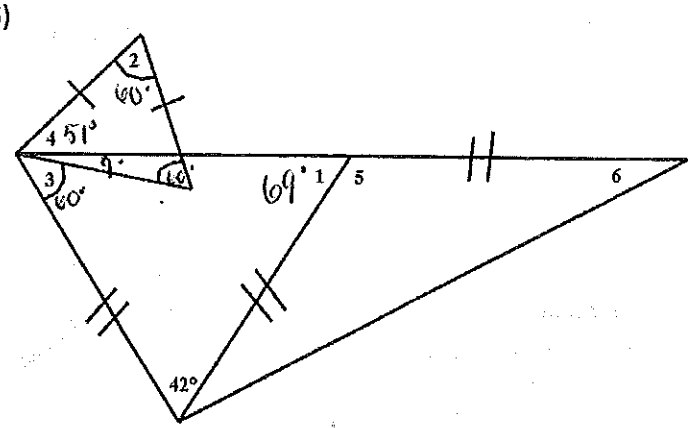

m<2 = 35°; m<3 = 70°; m<4 = 55°
m<5 = 55°

5)



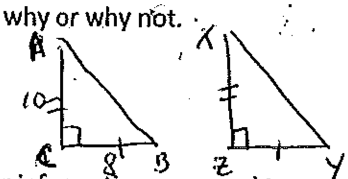

m<3 = 80°; m<2 = 90°; m<1 = 10°
m<4 = 100°, m<5 = 40°

6)




m<1 = 69°; m<2 = 60°; m<3 = 60°
m<4 = 51°; m<5 = 111°; m<6 = 34.5°

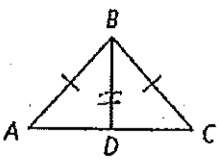
7. The longest leg of $\triangle ABC$, $\overline{AC}$ measures 10 centimeters, and $\overline{BC}$ measures 8 centimeters. You measure two of the legs of $\triangle XYZ$ and find that $\overline{AC} \cong \overline{XZ}$ and $\overline{BC} \cong \overline{YZ}$. Can you conclude that two triangles to be congruent by the HL Theorem? Explain why or why not.




No, you could use SAS, but not HL, b/c we don't know if hypotenuses are $\cong$

Determine what other information you need to prove the two triangles congruent. Then write the congruence statement and name the postulate or theorem you would use.

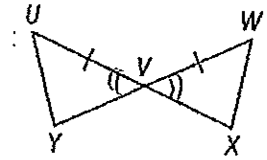
8.




To use SSS, you need $\overline{AD} \cong \overline{CD}$

To use SAS, you need $\angle ABD \cong \angle CBD$

9.



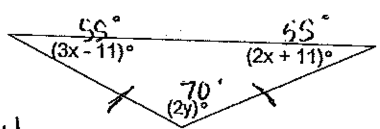

To use SAS, you need $\overline{YV} \cong \overline{XV}$

To use ASA, you need $\angle U \cong \angle W$

To use AAS, you need $\angle Y \cong \angle X$

10. Solve for x and y.

a)




$3x-11=2x+11$

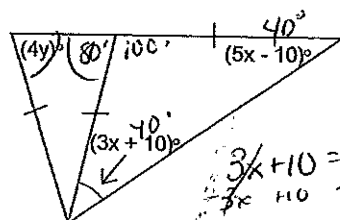
$-2x+11 \quad -2x+11$

$x=22$

$2y=70$

$y=35°$

b)




$4y=80$

$y=20$

$3x+10=5x-10$

$-3x+10 \quad -3x+10$

$20=2x$

$x=10$

11. Given $\triangle QRS \cong \triangle TUV$, $QS = 2x^2 - 3x$ and $TV = 2x + 12$. Find the values of $QS$ and $TV$.

| | $2x$ | $3$ |
|---|---|---|
| $-4$ | $-8x$ | $-12$ |
| $x$ | $2x^2$ | $3x$ |

$-24x^2$

$-8x \quad 3x$

$-5x$

$2x^2-3x=2x+12$

$-2x \quad -2x \quad -12$

$2x^2-5x-12=0$

$(2x+3)(x-4)=0$

$x=4$ or $-3/2$

$QS=2(4^2)-3(4)$

$32-12=20$

$TV=2(4)+12=20$

or $QS=2\left(\frac{-3}{2}^2\right)-3(\ldots$

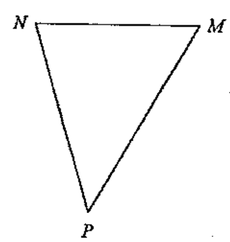
$2\left(\frac{9}{4}\right)+\frac{9}{2}$

$\frac{18}{4}+\frac{18}{4}=\frac{36}{4}$

$\frac{36}{4}=$

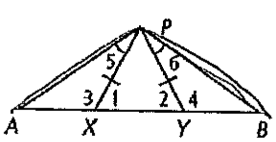
$TV=2\left(\frac{-3}{2}\right)+12=9$

12. Name the angle included by the sides $\overline{PN}$ and $\overline{NM}$ $\angle N$




13. Given: $\angle 5 \cong \angle 6, \overline{PX} \cong \overline{PY}$

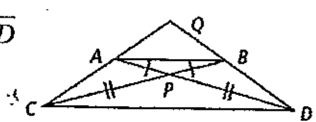
Prove: $\triangle PAB$ is isosceles.




| S | R |
|---|---|
| 1) $\angle 5 \cong \angle 6$; $\overline{PX} \cong \overline{PY}$ | 1) Given |
| 2) $\angle 1 \cong \angle 2$ | 2) Isos. $\triangle$ Thm |
| 3) $\angle 1$ supp. to $\angle 3$; $\angle 2$ supp. to $\angle 4$ | 3) Lin. Pr. Post. |
| 4) $\angle 3 \cong \angle 4$ | 4) $\cong$ suppl. Thm |
| 5) $\triangle APX \cong \triangle BPY$ | 5) ASA |
| 6) $\overline{PA} \cong \overline{PB}$ | 6) CPCTC |
| 7) $\triangle PAB$ is isos. | 7) Defn. isos. |

14. Given: $\overline{AP} \cong \overline{BP}, \overline{PC} \cong \overline{PD}$

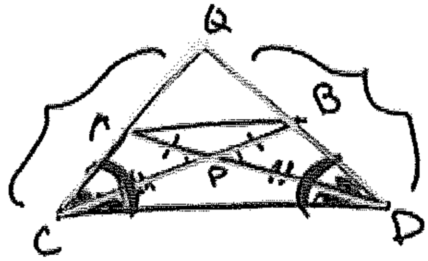
Prove: $\triangle QCD$ is isosceles



14)

G: $\overline{AP} \cong \overline{BP}$
$\overline{PC} \cong \overline{PD}$

P: $\Delta QCD$ is isos.




| S | R |
|---|---|
| 1) $\overline{AP} \cong \overline{BP}$ ; $\overline{PC} \cong \overline{PD}$ | 1) Given |
| 2) $\angle APC \cong \angle BPD$ | 2) Vert. ∡ Thm |
| 3) $\Delta APC \cong \Delta BPD$ | 3) SAS |
| 4) $\angle ACP \cong \angle BDP$ | 4) CPCTC |
| 5) $\angle PCD \cong \angle PDC$ | 5) Isos. Δ Thm |
| 6) $m\angle ACP + m\angle PCD = m\angle ACD$ <br> $\boxed{m\angle BDP + m\angle PDC} = \boxed{m\angle BDC}$ | 6) ∡ Add. Post. |
| 7) $\boxed{m\angle BDP + m\angle PDC} = m\angle ACD$ | 7) Substitution |
| 8) $\boxed{m\angle BDC = m\angle ACD}$ | 8) Substitution |
| 9) $\angle BDC \cong \angle ACD$ | 9) Defn. ≅ |
| 10) $\overline{QC} \cong \overline{QD}$ | 10) Conv. of Isos. Δ Thm |
| 11) $\Delta QCD$ is isos. | 11) Defn. isos. |