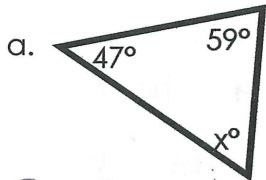**Geometry**
Review Worksheet: Triangle Congruence
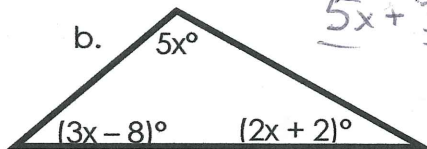
I. Interior and Exterior Angles.
2. Find the value of x. Show all work.

a.

$47 + 59 + x = 180$

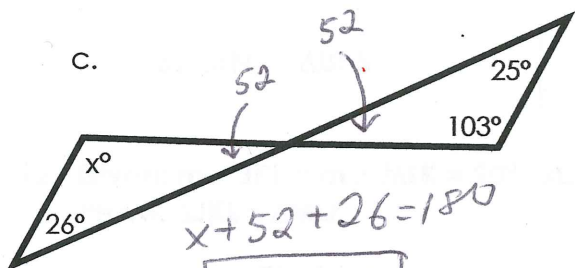$\boxed{x = 74}$

b.

$5x + 3x - 8 + 2x + 2 = 180$

$10x - 6 = 180$

$10x = 186$

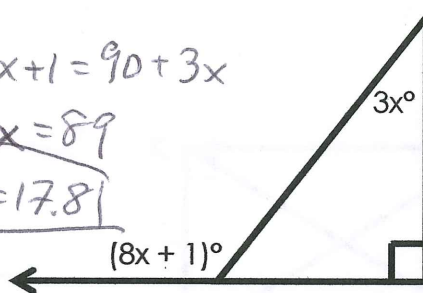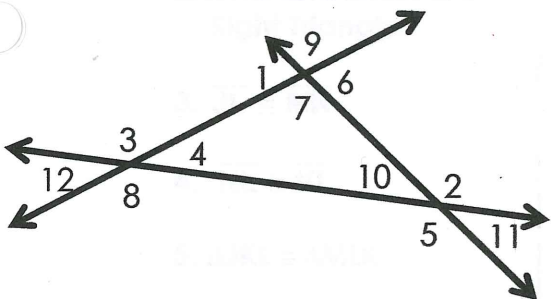$\boxed{x = 18.6}$

c.

$x + 52 + 26 = 180$

$\boxed{x = 102}$

d.

$8x + 1 = 90 + 3x$

$5x = 89$

$\boxed{x = 17.8}$

3. Use the figure below to complete each statement by using <, >, or =.

a. $m\angle 6 \; \underline{=} \; m\angle 1$ because ___vertical angles congruent___

b. $m\angle 4 \; \underline{<} \; m\angle 1$ because $m\angle 1 = m\angle 4 + m\angle 10$ ($\begin{smallmatrix}exterior\\angle\end{smallmatrix}$)

c. $m\angle 2 \; \underline{>} \; m\angle 7$ because ___triangle exterior angle theorem___

d. $m\angle 12 \; \underline{=} \; m\angle 4$ because ___vertical angles congruent___

II. Name the property illustrated by the statement.

4. If $\angle 1 \cong \angle 2$, then $\angle 2 \cong \angle 1$. ___Reflexive property of congruence___

5. If $\overline{UV} \cong \overline{WX}$ and $\overline{WX} \cong \overline{YZ}$, then $\overline{UV} \cong \overline{YZ}$. ___transitive property of equality___
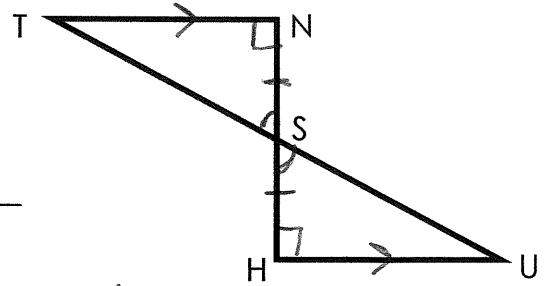
6. $\angle QRS \cong \angle SRQ$. _____

III. Congruent Triangles: Determine if there is enough information to prove the triangles are congruent. If so, state which postulate or theorem would be used to prove they are congruent. If not, write "not enough information".

7. SSS
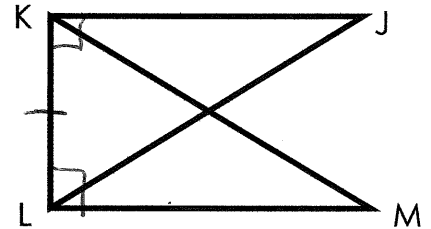
8. HL

9. Not enough info

10. SAS
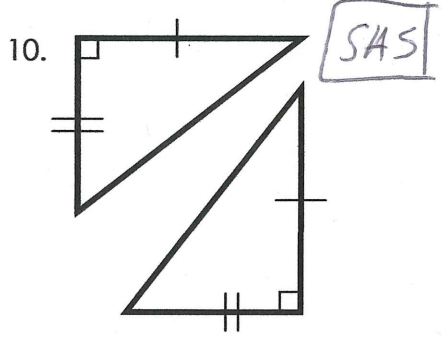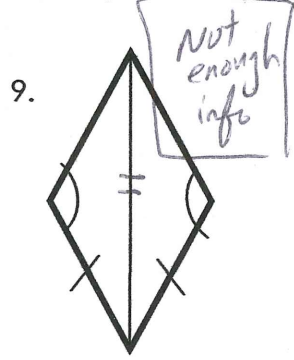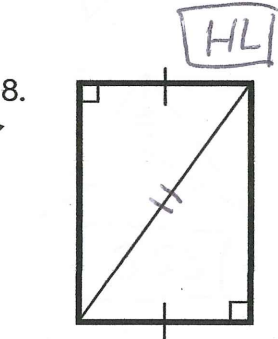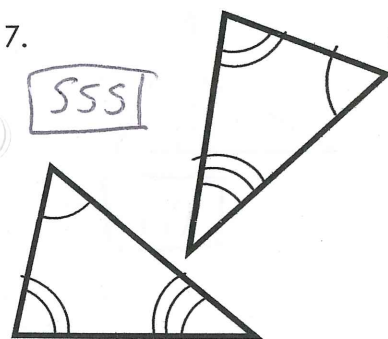
IV. Complete the following proofs.

11. Given: $\overline{NT} \parallel \overline{HU}$, $\overline{NS} \cong \overline{HS}$

   Prove: $\triangle TNS \cong \triangle UHS$

Statements	Reasons
1. $\overline{NT} \parallel \overline{HU}$	1. Given
2. $\angle TNS \cong \angle UHS$	2. Right angles congruent
3. $\overline{NS} \cong \overline{HS}$	3. Given
4. $\angle TSN \cong \angle USH$	4. Vertical angles congruent
5. $\triangle TNS \cong \triangle UHS$	5. ASA

12. Given: $m\angle JKL = m\angle MLK = 90°$, $\overline{JL} \cong \overline{MK}$

    Prove: $\triangle JKL \cong \triangle MLK$

Statements	Reasons
1. $\angle JKL = m\angle MLK = 90°$	1. Given
2. $\triangle JKL$ and $\triangle MLK$ are Right Triangles	2. Definition of a right triangle
3. $\overline{JL} \cong \overline{MK}$	3. Given
4. $\overline{KL} \cong \overline{KL}$	4. Reflexive Property
5. $\triangle JKL \cong \triangle MLK$	5. HL

13.

Tell which theorem (SSS, SAS, ASA, AAS, HL) can be used to prove the triangles congruent. Remember to mark vertical angles and segments that are equal to themselves (reflexive property)

ASA

Not enough info

AAS

HL

SSS
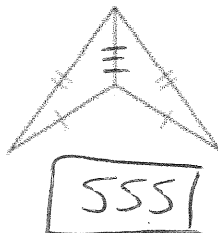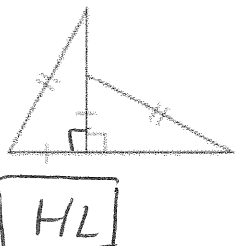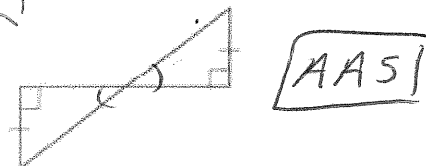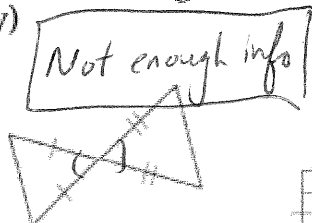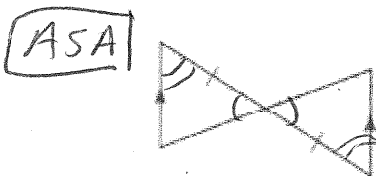
14.

Given: $\angle DAG \cong \angle WAS$, $\angle WAS \cong \angle SAG$,
  $m\angle DAG = 2x + 8$, $m\angle WAS = 3x - 18$
Prove: $m\angle SAG = 60°$
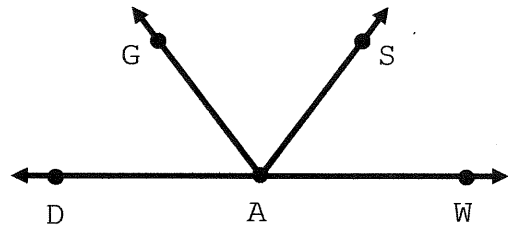
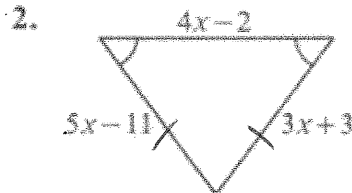| Statements	Reasons
1. $\angle DAG \cong \angle WAS$, $m\angle DAG = 2x + 8$ $m\angle WAS = 3x - 18$	1. **Given**
2. $3x - 18 = 2x + 8$	2. Substitution
3. $x - 18 = 8$	3. Addition
4. $x = 26$	4. Subtraction
5. $m\angle WAS = 60°$	5. Substitution
6. $\angle WAS \cong \angle SAG$	6. **Given**
7. $m\angle WAS = m\angle SAG$	7. Def. of congruent angles
8. $m\angle SAG = 60°$	8. transitive property of congruence (or substitution)

15.

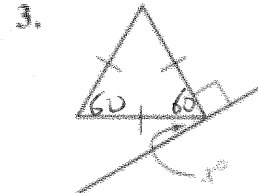Find the value of x.

1.

$2x + 40 = 180$
$2x = 140$
$\boxed{x = 70}$

2.

$5x - 11 = 3x + 3$
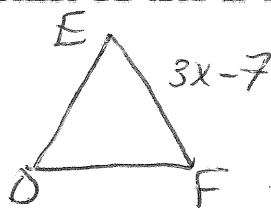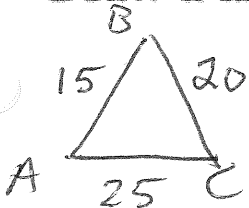$2x = 14$
$\boxed{x = 7}$

3.
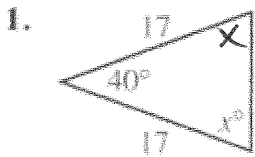
$x + 60 + 90 = 180$
$x + 150 = 180$
$\boxed{x = 30}$

16.

Given $\triangle ABC \cong \triangle DEF$, $AB = 15$, $BC = 20$, $AC = 25$, and $FE = 3x - 7$, find x.

Draw a diagram of the 2 triangles and label. Then find x.

$3x - 7 = 20$
$3x = 27$ $\boxed{x = 9}$

$BC \cong EF$ (CPCTC)

17.
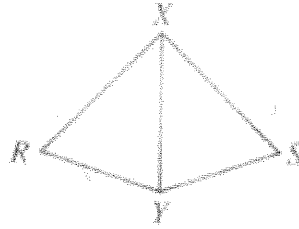
In each case, mark the diagram with the information given, and decide whether you can conclude that △RXY is congruent to △SXY. If you do, say why (SSS, SAS, ASA, AAS). If you don't, say so.

(a) Given: $\overline{RX} \cong \overline{SX}$; $\overline{RY} \cong \overline{SY}$
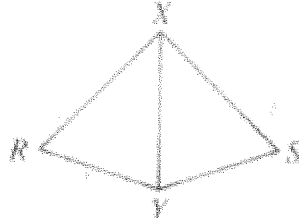
XY = XY (Reflexive property)

SSS

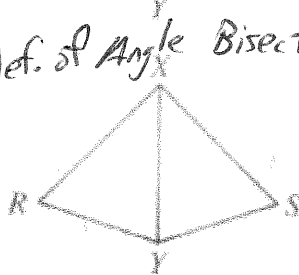(b) Given: $\overline{RY} \cong \overline{SY}$; $\angle R \cong \angle S$

Not enough info

(c) Given: $\overline{XY}$ bisects $\angle RXS$ and $\angle RYS$.

∠RXY = ∠SXY ∠RYX = ∠SYX (Def. of Angle Bisector)
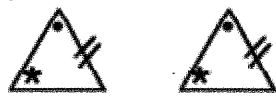XY = XY (Reflexive property)

ASA

18. If the triangles below can be proved congruent by one of the five properties you have had (SAS, ASA, AAS, SSS, HL) write its initials. If not, state "no property"
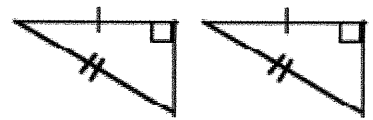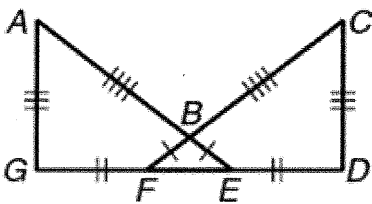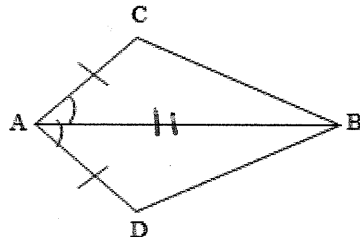
ASA

AAS

SSA - not enough info

HL

△AGE ≅ △CDF SSS

△ACB ≅ △ADB SAS

△WYX ≅ △WZV AAS