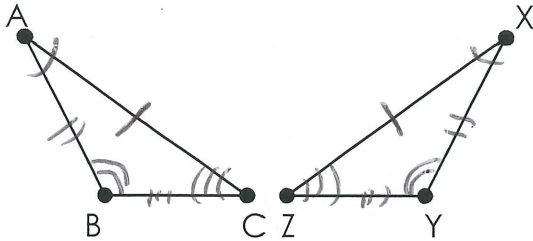**Geometry**
Notes: Triangle Congruence (SSS & SAS)
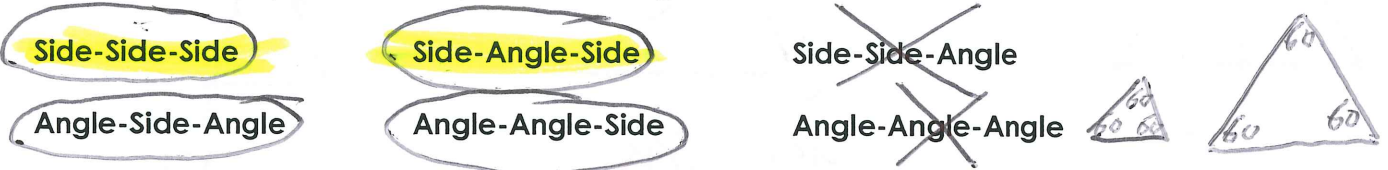**Textbook: Lesson 4-4, page 264 - 272**
Homework:

Essential Question: What are the similarities and differences between the five congruence postulates and theorems?

In a previous lesson, we showed how triangles are congruent according to the *definition of congruent triangles*. If △ABC ≅ △XYZ, what else do we know?


However, there ways to know whether or not two triangles are congruent with less information than all 6 pairs of corresponding parts. When working with 3 measurements (angles, or sides, or a combination of the two), there are 6 possible arrangements:

Side-Side-Side   Side-Angle-Side   Side-Side-Angle

Angle-Side-Angle   Angle-Angle-Side   Angle-Angle-Angle

Two of these arrangements of congruent corresponding parts will not guarantee that triangles are congruent: __SSA__ and __AAA__. The other four arrangements of measurements and a special theorem for right triangles *will* guarantee that triangles are congruent.
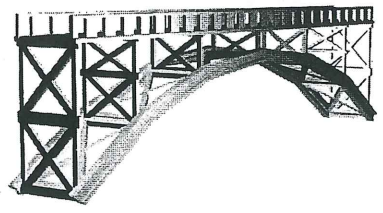
Side-Side-Side Congruence Postulate (SSS ≅ Postulate): If ____3____ sides of one triangle are congruent with three ____3____ of another triangle, then the triangles are __congruent__.
   Diagram:
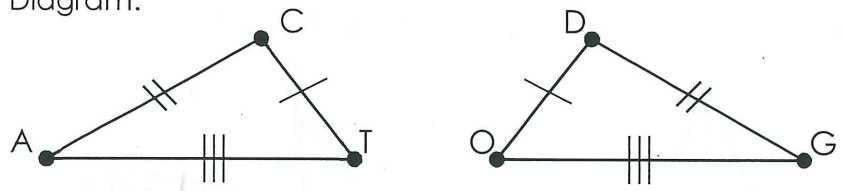
△ACT ≅ △GDO

The SSS ≅ Postulate shows why triangles are used when constructing buildings, bridges, and even bookshelves. Three given side lengths **cannot** create more than one possible triangular shape. So, when a structure is composed of triangles, it **cannot** change its shape. For this reason, a triangle is known as a **rigid shape**.

Side-Angle-Side Congruence Postulate (SAS ≅ Postulate): If two sides and the __*included*__ angle of one triangle are congruent with __2__ sides and the included angle of another triangle, then the triangles are congruent.
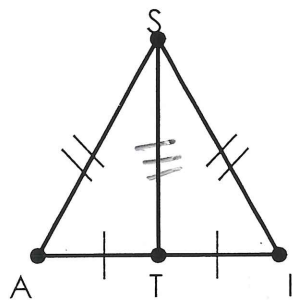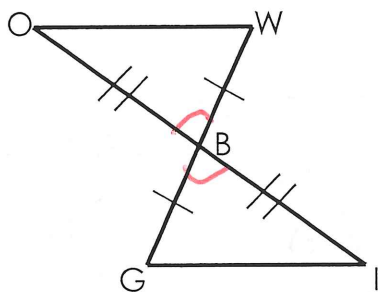
Diagram:
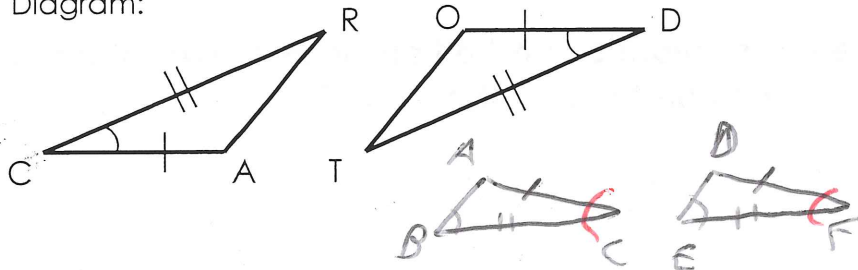
angle has be between the 2 marked sides

Examples: Determine whether the congruence statement is true based on the given figure. *Explain* your reasoning.
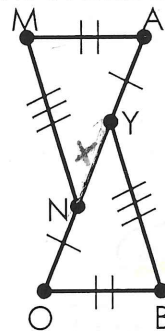
a. △SAT ≅ △SIT

yes $\boxed{SSS}$ ✓

b. △BOW ≅ △BIG

yes, SAS

c. △MAN ≅ △BOY

yes, SSS

d. △BUM ≅ △MOB
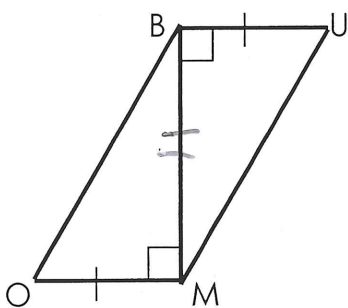
yes, SAS
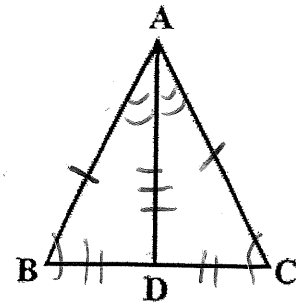
e. △BAT ≅ △RAT
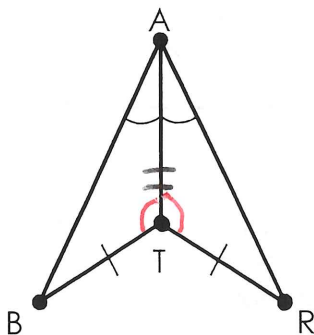
SSA, not enough info

f. △SEA ≅ △WET
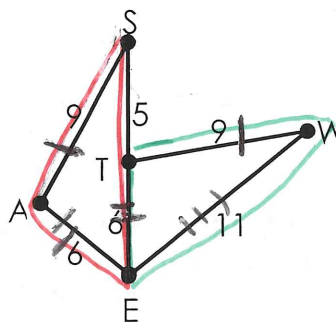
SSS, yes

Name:_____

Given: $\overline{AB} \cong \overline{AC}, \overline{BD} \cong \overline{CD}$, $\angle B \cong \angle C$, $\angle BAD \cong \angle CAD$
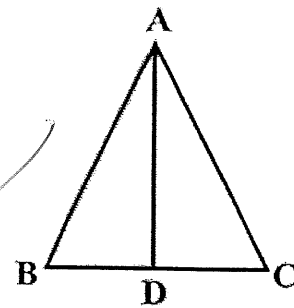
Prove: $\triangle ABD \cong \triangle ACD$

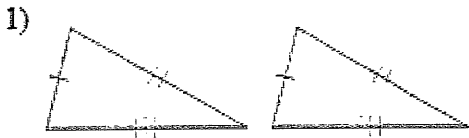| Statements	Reasons
1) $\overline{AB} \cong \overline{AC}$, $\overline{BD} \cong \overline{CD}$	Given
2) $AD \cong AD$	Reflexive Property
3) $\angle B \cong \angle C$ $\angle BAD \cong \angle CAD$	Given
4) $\angle BDA \cong \angle CDA$	3ʳ angle theorem
5) $\triangle ABD \cong \triangle ACD$	Definition of Congruent Triangles

Name:_____

Given: $\overline{AB} \cong \overline{AC}, \overline{BD} \cong \overline{CD}$, $\angle B \cong \angle C$, $\angle BAD \cong \angle CAD$
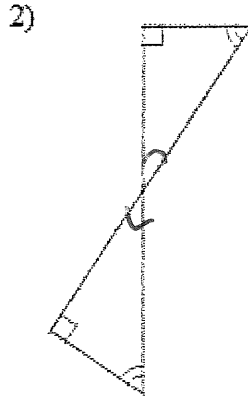
Prove: $\triangle ABD \cong \triangle ACD$

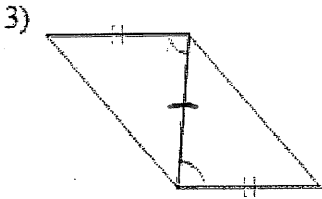| Statements	Reasons
$\overline{AB} \cong \overline{AC}$, $\overline{BD} \cong \overline{CD}$	
	Reflexive Property
	Given
$\angle BDA \cong \angle CDA$	
	Definition of Congruent Triangles

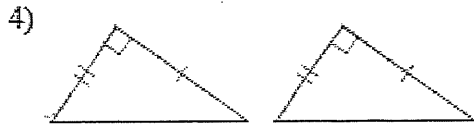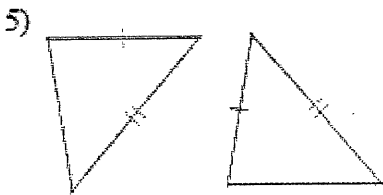**State if the two triangles are congruent. If they are, state how you know.**
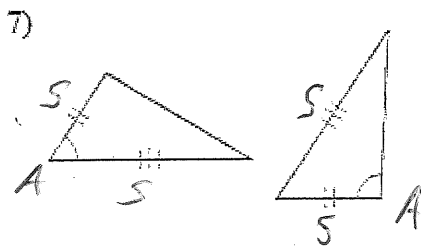
1)

SSS

2)

AAA, not
enough info

3)

SAS

4)

SAS

5)

not enough
info

6)

SAS

7)

not
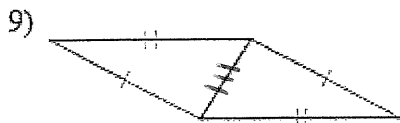enough
info

8)

not
enough info

9)

SSS

10)

SAS

Name _____ Date _____ Period _____
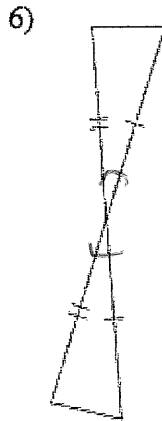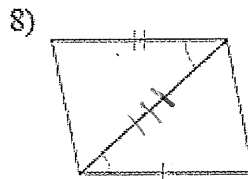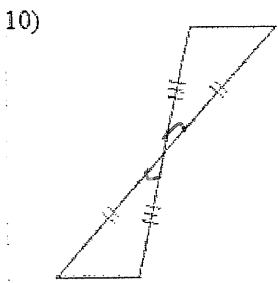
Geometry
SSS and SAS - Triangle Congruence Homework

Determine if the triangles are congruent. If they are (1) state the postulate used and (2) write a congruence statement. If not, explain why.

1.

J   M

K   L   N

SSS

2.

L
N
M
P
O

AAA,
not enough info

3.

B
2
F
7   5
A   D
X   7
5
C
1
E

not enough info

4.

B   E

A   D   C   F

SSS

5.

E
2   10
B
10   X
F   8   D
2
A   8   C

SSS

6.

A
D
B   C
E

not enough info

Determine if the given congruence statement is correct. If it is not, correct it.
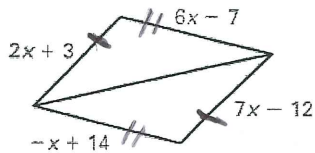
7. $\triangle ABD \cong \triangle CDB$

A _____ B
D _____ C

✓   SSS

8. $\triangle RST \cong \triangle RQT$

S
T _____ R
Q

✓   SSS

9. $\triangle ABC \cong \triangle DEF$

B   E
A
C   F   D

✓   SSS

10. Determine all values of x that would make the 2 triangles congruent. Explain.

2x + 3   6x − 7
7x − 12
−x + 14

$7x - 12 = 2x + 3$
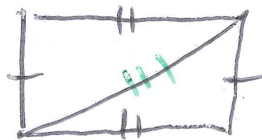
$5x = 15$

$x = 3$

$6x - 7 = -x + 14$

$7x = 21$ $x = 3$

11. Mrs. Gibbons is making a sandwich for her two twin girls. She uses 2 rectangular pieces of bread to make one sandwich and then cuts along the diagonal. Are the two triangular sandwiches congruent? Explain.

yes, by SSS

Use the diagram to name the included angle between the given pair of sides.

1. $\overline{GH}$ and $\overline{HI}$ $\angle GHI$
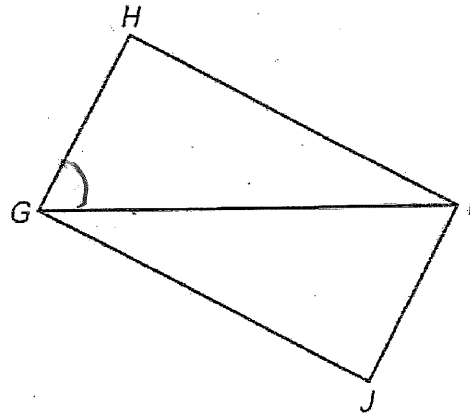
2. $\overline{HI}$ and $\overline{IG}$ $\angle HIG$

3. $\overline{IG}$ and $\overline{HG}$ $\angle IGH$

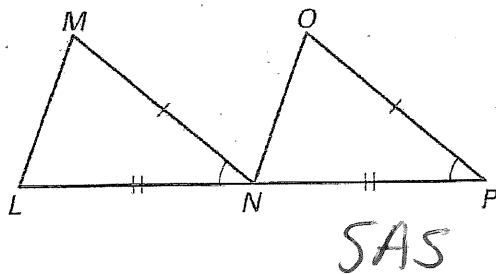4. $\overline{GI}$ and $\overline{IJ}$ $\angle GIJ$

5. $\overline{JG}$ and $\overline{IG}$ $\angle JGI$

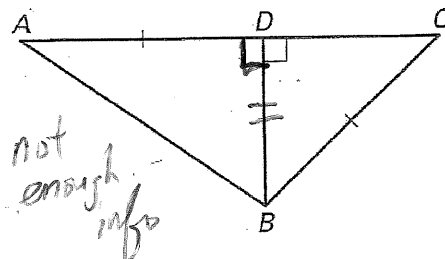6. $\overline{IJ}$ and $\overline{GJ}$ $\angle IJG$

Decide whether enough information is given to prove that the triangles are congruent using the SAS Congruence Postulate.
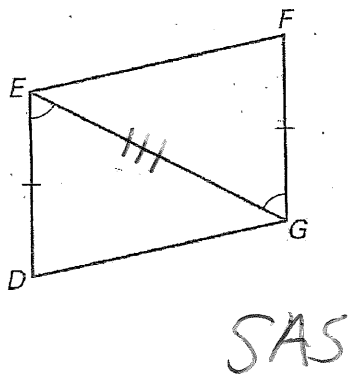
7. $\triangle LMN$, $\triangle NOP$

SAS

8. $\triangle ABD$, $\triangle CBD$

not enough info

9. $\triangle DEG$, $\triangle FGE$

SAS

10. $\triangle RST$, $\triangle VUT$

SSA

not enough info