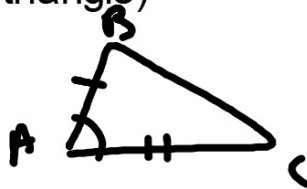Geometry 4.4
Use SSS to test for triangle congruence
Use SAS to test for triangle congruence
corresponding parts (of a triangle)
included angle
construction
CPCTC

activ: exploragons

construction: SSS, SAS triangles

Exploragons:
Each person in the group creates the same triangle.

- Create a triangle using red, yellow, green
- Compare with your group
- Record your results

- Create another triangle using 3 different colors (your choice)
- Compare & record results

Postulate 4.1 Side-Side-Side (SSS) Congruence

If three sides of one triangle are congruent to three sides
of a second triangle, then the triangles are congruent.

Example If Side $\overline{AB} \cong \overline{DE}$,

Side $\overline{BC} \cong \overline{EF}$, and

Side $\overline{AC} \cong \overline{DF}$,

then $\triangle ABC \cong \triangle DEF$.
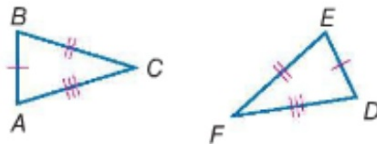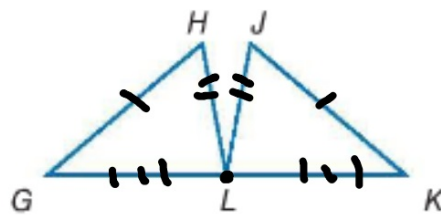
$\triangle ABC \cong \triangle DEF$

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Example 1 Use SSS to Prove Triangles Congruent

Write a flow proof.

Given: $\overline{GH} \cong \overline{KJ}$, $\overline{HL} \cong \overline{JL}$, and L is the midpoint of $\overline{GK}$.

Prove: $\triangle GHL \cong \triangle KJL$

1. $\overline{GH} \cong \overline{KJ}$ $\overline{HL} \cong \overline{JL}$ | 1. Given
   L is mp
2. $\overline{GL} \cong \overline{KL}$ | 2. def mp
3. $\triangle GHL \cong \triangle KJL$ | 3. SSS

Prove 3 pairs of sides
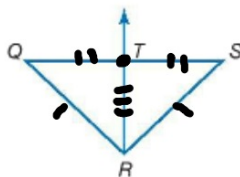When directions are flow proof: use the format of your choice (paragraph or two-column)

1. Write a flow proof.

Given: $\triangle QRS$ is isosceles with $\overline{QR} \cong \overline{SR}$.
$\overline{RT}$ bisects $\overline{QS}$ at point T.

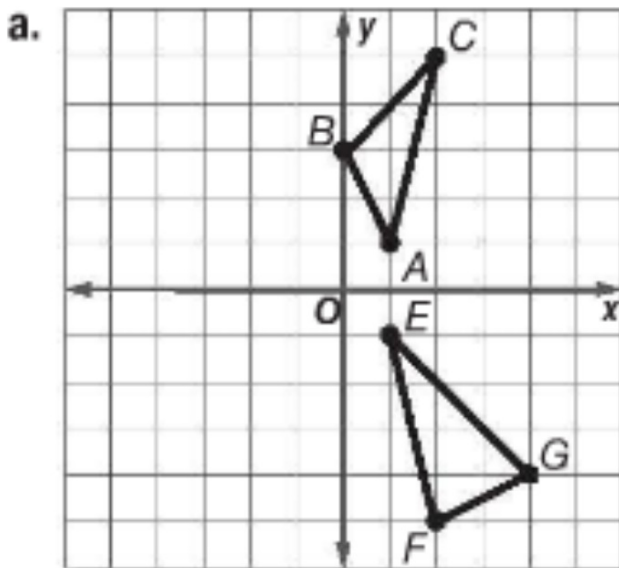**Prove:** $\triangle QRT \cong \triangle SRT$

Statements	Reasons
1. $\overline{QR} \cong \overline{SR}$ $\overline{RT}$ bisects $\overline{QS}$	1. given
2. $\overline{QT} \cong \overline{ST}$	2. def bisect
3. $\overline{TR} \cong \overline{TR}$	3. reflex
4. $\triangle QRT \cong \triangle SRT$	4. SSS

EXTENDED RESPONSE Triangle ABC has vertices $A(1, 1)$, $B(0, 3)$, and $C(2, 5)$.
Triangle EFG has vertices $E(1, -1)$, $F(2, -5)$, and $G(4, -4)$.

a. Graph both triangles on the same coordinate plane.

b. Use your graph to make a conjecture as to whether the triangles are congruent.
   Explain your reasoning.

c. Write a logical argument using coordinate geometry to support the conjecture
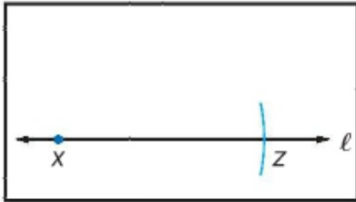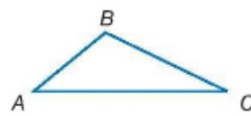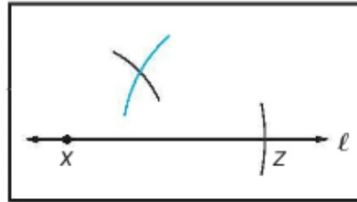   you made in part b.

a.

SSS   P. 266

Draw a triangle and label it △ABC. Then use the
SSS Postulate to construct △XYZ ≅ △ABC.

Step 1 Draw point X on a line ℓ. Then
construct $\overline{XZ} \cong \overline{AC}$ on line ℓ

Step 2 Construct one arc with radius
AB centered at point X and
another arc with radius BC
centered at point Z.
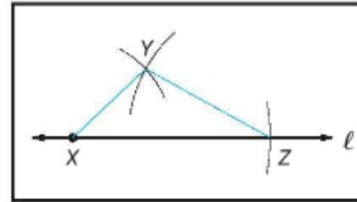
Step 3 Label the point of intersection
of the two arcs Y. Draw $\overline{XY}$
and $\overline{ZY}$ to form △XYZ.

Demo: Spaghetti and angle
What is an included angle?

Use your protractor to draw an angle of 40 degrees.
Use spaghetti to form sides of 5 cm and 8 cm so that the angle is included.

Write a sentence about your observations.
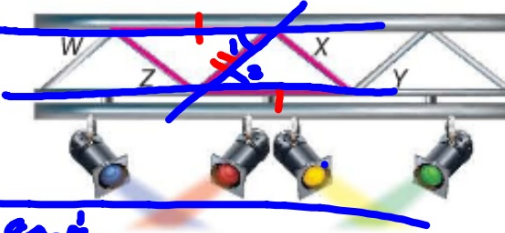80 degrees, 10 cm, 3 cm
130 degrees, 10 cm, 8 cm

4.4.   5.27 odd
(Constr.)

Real-World Example 3 Use SAS to Prove Triangles are Congruent

LIGHTING The scaffolding for stage lighting shown appears to be made up of congruent triangles. If $\overline{WX} \cong \overline{YZ}$ and $\overline{WX} \parallel \overline{ZY}$, write a two-column proof to prove that $\triangle WXZ \cong \triangle YZX$.
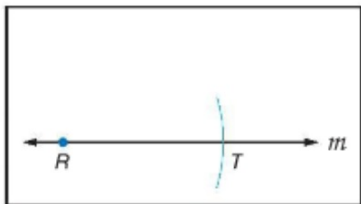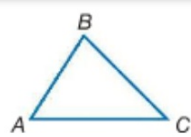
1. $\overline{WX} \cong \overline{YZ}$ $\overline{WX} \parallel \overline{ZY}$ | given
2. $\overline{ZX} \cong \overline{ZX}$ | refl.
3. $\angle 1 \cong \angle 2$ | AIA
4. $\triangle WXZ \cong \triangle YZX$ | SAS

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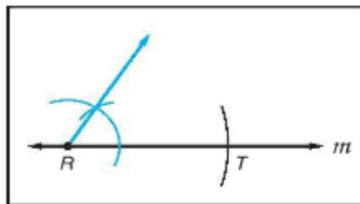
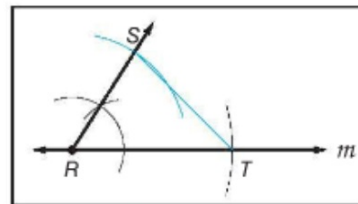**⚠ Construction** Congruent Triangles Using Two Sides and the Included Angle

Draw a triangle and label it △ABC.
Then use the SAS Postulate to construct
△RST ≅ △ABC.

Step 1 Draw point R on a line m. Then construct $\overline{RT} \cong \overline{AC}$ on line m.

Step 2 Construct $\angle R \cong \angle A$ using $\overline{RT}$ as a side of the angle and point R.

Step 3 Construct $\overline{RS} \cong \overline{AB}$. Then draw $\overline{ST}$ to form △RST.

Example 4 Use SAS or SSS in Proofs

Write a paragraph proof.

Given: $\overline{BC} \cong \overline{DC}$, $\angle BCF \cong \angle DCE$, $\overline{FC} \cong \overline{EC}$

Prove: $\angle CFD \cong \angle CEB$