

ANSWER MAZE



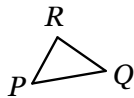
THE SAS TRIANGLE CONGRUENCE CRITERION

Is It Included-Angle SAS?

One page · 10–15 minutes · nothing to prepare

FREE

4



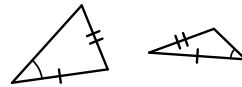
Sides $\overline{PQ}$ and $\overline{QR}$. Which angle is between them?

$\angle P \rightarrow$ go to 3

$\angle Q \rightarrow$ go to 7

Circle the letter in both side names.

7



Do the marks give included-angle SAS?

No. The arc is not between the ticked sides. $\rightarrow$
go to 2

Yes. Two ticked sides and an arc are marked. $\rightarrow$
go to 6

Trace each ticked side with a finger, end to end.

Answer Maze — how to run it

10–15 minutes

1. **Hand out page 3**, one per student. Nothing else is needed.
2. **Say this once:** *“Start at box 4. The angle between two sides is at the letter both side names share. Write every box number in the row at the bottom as you go.”*
3. **Check a sheet quickly.** A student with no mistakes writes **4 7 2 5 8 1**: six boxes, then out.

Student sheet	page 3, one per student. It shows the included angle, included-angle SAS and vertical angles as small pictures.
Answers	page 4.

Every wrong answer comes from one mistake about the angle between two sides. Some boxes show it with letters. The student takes the letter written first, or thinks the angle must be written between the two sides in a list. These wrong answers send the student to box 3. Other boxes show it in a drawing. The student uses an arc that is not between the ticked sides, misses the vertical angles where two segments cross, or uses vertical angles that are not between the ticked sides. These wrong answers send the student to box 6. Boxes 3 and 6 ask the same kind of question again, and both of their answers lead back to the route.

The row at the bottom is the check. A clean run is six numbers. Each wrong answer adds at least one more. The hint in every box says what to look at, never which answer is right.

Guessing does not get a student out. Every simple guessing rule, such as always taking the first answer, goes wrong within the first two boxes.



This is the free lesson this activity came from. The worksheet, the full answers and the lesson plan are on it, at three levels of difficulty.
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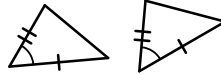
Name _____

Period _____

Date _____



The **included angle** of two sides is **between** them. It is at the letter the two side names share.



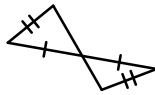
Included-angle SAS: two pairs of sides, and the angle **between** them.



Vertical angles face each other where two segments cross. They are always equal.

Choose an answer in each box, and go to the box it names.

1



Do the marks give included-angle SAS?

No. The ticked sides do not join at the crossing. → you are out

Yes. The crossing gives vertical angles. → go to 6

In one triangle, find the corner where the two marks meet.

2

In $\triangle ABC$ and $\triangle DEF$: $\angle A \cong \angle D$, $\overline{AB} \cong \overline{DE}$, $\overline{AC} \cong \overline{DF}$.

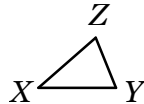
Is this included-angle SAS?

No. The angle is not written between the sides. → go to 3

Yes. A is in both side names. → go to 5

Check the letters of AB and AC, not the order of the lines.

3



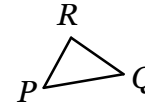
Sides $\overline{XY}$ and $\overline{XZ}$. Which angle is between them?

$\angle Y \rightarrow$ **go to 4**

$\angle X \rightarrow$ **go to 7**

Write XY above XZ and compare the letters.

4



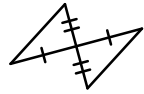
Sides $\overline{PQ}$ and $\overline{QR}$. Which angle is between them?

$\angle P \rightarrow$ **go to 3**

$\angle Q \rightarrow$ **go to 7**

Circle the letter in both side names.

5



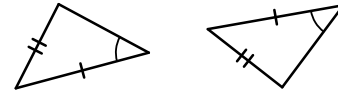
Do the marks give included-angle SAS?

Yes. The crossing gives vertical angles. → go to 8

No. No angle at the crossing has an arc. → go to 6

Look at the two angles that face each other at the crossing.

6



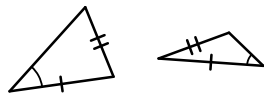
Do the marks give included-angle SAS?

No. Only one ticked side ends at the arc. → go to 2

Yes. Two ticked sides and an arc are marked. → go to 7

Follow the one-tick line and the two-tick line to their meeting point.

7



Do the marks give included-angle SAS?

No. The arc is not between the ticked sides. → go to 2

Yes. Two ticked sides and an arc are marked. → go to 6

Trace each ticked side with a finger, end to end.

8

In $\triangle ABC$ and $\triangle DEF$: $\overline{AB} \cong \overline{DE}$, $\overline{BC} \cong \overline{EF}$.

Which extra fact gives included-angle SAS?

$\angle A \cong \angle D \rightarrow$ **go to 3**

$\angle B \cong \angle E \rightarrow$ **go to 1**

Circle the letter that AB and BC both use.

Write each box number as you reach it:

--	--	--	--	--	--	--	--	--



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The route, in order. Boxes 3 and 6 are not on it. A student reaches them only by a wrong answer. They are the last two rows of the table.

4 → 7 → 2 → 5 → 8 → 1 → out

	Box	Right answer, and why	Wrong answer, and why a student picks it
1	Box 4	∠Q PQ and QR share the letter Q, so the angle between them is ∠Q.	“∠P” goes to box 3. A student who takes the letter written first picks ∠P.
2	Box 7	No. The arc is not between the ticked sides. The arc is at a corner where only one ticked side ends. The triangles are not even the same size.	“Yes. Two ticked sides and an arc are marked.” goes to box 6. A student who thinks any two sides and any angle are enough picks this.
3	Box 2	Yes. A is in both side names. AB and AC share the letter A, and $\angle A \cong \angle D$ is given. The order of the lines does not matter.	“No. The angle is not written between the sides.” goes to box 3. A student who reads the criterion off the order of the lines picks this.
4	Box 5	Yes. The crossing gives vertical angles. Both segments are cut in half. The vertical angles at the crossing are equal, and each is between two ticked sides.	“No. No angle at the crossing has an arc.” goes to box 6. A student who does not see the vertical angles picks this.
5	Box 8	$\angle B \cong \angle E$ AB and BC share the letter B, so the angle between them is ∠B, and its partner is ∠E.	“ $\angle A \cong \angle D$ ” goes to box 3. A student who takes the letter written first picks ∠A.
6	Box 1	No. The ticked sides do not join at the crossing. In each triangle the ticked sides meet at the outer corner, not at the crossing. The triangles are not even the same size.	“Yes. The crossing gives vertical angles.” goes to box 6. A student who thinks a crossing always gives included-angle SAS picks this.
	Box 3	∠X XY and XZ share the letter X, so the angle between them is ∠X.	“∠Y” goes to box 4. A student who takes a letter that is in only one name picks ∠Y.
	Box 6	No. Only one ticked side ends at the arc. The two ticked sides meet at another corner. The arc must be at that corner.	“Yes. Two ticked sides and an arc are marked.” goes to box 7. A student who still uses any marked angle picks this.

Included-angle SAS needs the equal angles to be between the two pairs of equal sides. The angle between two sides is at the letter the two side names share. Where two segments cross, the two angles that face each other are vertical angles, so they are equal.

A student can find the last four boxes of the route by following the arrows backward from “you are out.” So ask a student with a clean row to explain one box.