

ANSWER MAZE



CPCTC: CORRESPONDING PARTS OF CONGRUENT TRIANGLES

CPCTC: Into or Out of a Congruence?

One page · 10–15 minutes · nothing to prepare

FREE

2

Given: $AB \cong DE$, $\angle B \cong \angle E$, $BC \cong EF$. What is the reason for the row $\triangle ABC \cong \triangle DEF$?

CPCTC. The matching parts are congruent.

→ go to 4

SAS. Two sides and the angle between them.

→ go to 5

Read the three given facts. Then find the small picture that fits them.

5

$\triangle ABC \cong \triangle DEF$ by SSS, from $AB \cong DE$, $BC \cong EF$, $CA \cong FD$. Which row gives a new fact?

$BC \cong EF$, by CPCTC. → go to 7

$\angle B \cong \angle E$, by CPCTC. → go to 8

Cross out each pair that is already among the facts SSS used.

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 2. Choose an answer and go to the box it names. Write every box number in the row at the bottom as you go.”*
3. **Check a sheet quickly.** A student with no mistakes writes **2 5 8 1 6 3**: six boxes, then out.

Student sheet	page 3, one per student. The box at the top shows the four criteria as small marked triangles, and what CPCTC means.
Answers	page 4.

Every wrong answer comes from one of two mistakes. The first mistake is using CPCTC in the wrong place. A criterion (SSS, SAS, ASA or AAS) proves two triangles congruent. CPCTC comes after that, and proves one pair of matching parts. Students write “ $\triangle ABC \cong \triangle DEF$, by CPCTC,” or use CPCTC when the facts prove nothing, such as three pairs of angles. They also write a criterion as the reason for one pair of parts. These wrong answers send the student to box 4.

The second mistake is losing track of the goal. A student counts the fact to be proved as one of the three pairs, so the proof uses what it has to prove. A student writes a pair that was already given as the “new” fact. A student stops when the triangles are congruent and never writes the row that was asked for. These wrong answers send the student to box 7. Boxes 4 and 7 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. Guessing does not get a student out: every simple guessing rule, such as always taking the first answer, goes wrong within the first four 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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Answer Maze

Start at box 2 · into or out of a congruence?

Name _____

Period _____

Date _____

INTO a congruence. These facts prove $\triangle ABC \cong \triangle DEF$. The reason is the name.



SSS



SAS



ASA



AAS



SSA



AAA

These prove nothing.

OUT OF a congruence. After $\triangle ABC \cong \triangle DEF$ is proved, every matching part is congruent. The reason is **CPCTC**: Corresponding Parts of Congruent Triangles are Congruent.
A matches D. B matches E. C matches F.

Every box is about $\triangle ABC$ and $\triangle DEF$. Read the box. Choose an answer, and go to the box it names.

1

Prove: $AC \cong DF$. Given: $AB \cong DE$, $BC \cong EF$. Sam writes $\triangle ABC \cong \triangle DEF$ by SSS, from $AB \cong DE$, $BC \cong EF$ and $AC \cong DF$. Is Sam's proof right?

No. It uses $AC \cong DF$, the fact it has to prove. → go to 6
Yes. SSS needs three pairs of sides, and it has three. → go to 7

Put a finger on the first line. Look for it again in Sam's list.

2

Given: $AB \cong DE$, $\angle B \cong \angle E$, $BC \cong EF$. What is the reason for the row $\triangle ABC \cong \triangle DEF$?

CPCTC. The matching parts are congruent. → go to 4
SAS. Two sides and the angle between them. → go to 5

Read the three given facts. Then find the small picture that fits them.

3

Prove: $\angle A \cong \angle D$. A proof ends with the row $\triangle ABC \cong \triangle DEF$, by SAS. Is the proof finished?

Yes. It shows the triangles are congruent. → go to 7
No. It needs one more row: $\angle A \cong \angle D$, by CPCTC. you are out

Read the line that starts with Prove. Compare it with the end of the proof.

4

Given: $AB \cong DE$, $BC \cong EF$, $CA \cong FD$. What is the reason for the row $\triangle ABC \cong \triangle DEF$?

CPCTC. The three sides match. → go to 2
SSS. Three pairs of sides. → go to 5

Check whether the row names two triangles or two parts.

5

$\triangle ABC \cong \triangle DEF$ by SSS, from $AB \cong DE$, $BC \cong EF$, $CA \cong FD$. Which row gives a new fact?

$BC \cong EF$, by CPCTC. → go to 7
 $\angle B \cong \angle E$, by CPCTC. → go to 8

Cross out each pair that is already among the facts SSS used.

6

Given: $AB \cong DE$, $\angle A \cong \angle D$, $\angle C \cong \angle F$. The proof has the row $\triangle ABC \cong \triangle DEF$, by AAS. Can the next row be $BC \cong EF$, by CPCTC?

Yes. AAS comes first, and CPCTC after it. → go to 3
No. The reason for $BC \cong EF$ must be AAS. → go to 4

Read the row before. Then ask: does the next row name two triangles or two parts?

7

$\triangle ABC \cong \triangle DEF$ by ASA, from $\angle A \cong \angle D$, $AB \cong DE$, $\angle B \cong \angle E$. Which row gives a new fact?

$AC \cong DF$, by CPCTC. → go to 8
 $AB \cong DE$, by CPCTC. → go to 5

Write the six matching pairs. Cross out the three given facts.

8

Given: $\angle A \cong \angle D$, $\angle B \cong \angle E$, $\angle C \cong \angle F$. Can the next row be $AB \cong DE$, by CPCTC?

Yes. The angles match, so the sides match too. → go to 4
No. Three angles do not prove the triangles congruent. → go to 1

Find these facts among the six small pictures at the top of the page.

Write each box number as you reach it:

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The route, in order. Boxes 4 and 7 are not on it. A student reaches them only by a wrong answer. They are the last two rows of the table.

2 → 5 → 8 → 1 → 6 → 3 → out

	Box	Right answer, and why	Wrong answer, and why a student picks it
1	Box 2	SAS. Two sides and the angle between them. AB and BC are two sides, and $\angle B$ is the angle between them. That is SAS, and SAS proves the triangles congruent.	“CPCTC. The matching parts are congruent.” goes to box 4. A student who reads “congruent triangles” in the name CPCTC thinks it proves triangles congruent.
2	Box 5	$\angle B \cong \angle E$, by CPCTC. SSS used the three pairs of sides. The three pairs of angles are the new facts, so $\angle B \cong \angle E$ is new.	“ $BC \cong EF$, by CPCTC.” goes to box 7. $BC \cong EF$ is true, but it is one of the given facts. A student who does not track the pairs already used picks it.
3	Box 8	No. Three angles do not prove the triangles congruent. Three pairs of equal angles give the same shape, but not the same size. The triangles are not proved congruent, so CPCTC cannot be used.	“Yes. The angles match, so the sides match too.” goes to box 4. A student who uses CPCTC before the triangles are proved congruent picks this.
4	Box 1	No. It uses $AC \cong DF$, the fact it has to prove. $AC \cong DF$ is what Sam has to prove, and he uses it as one of his three pairs. A fact cannot be used to prove itself.	“Yes. SSS needs three pairs of sides, and it has three.” goes to box 7. A student who counts the pair to be proved as one of the three pairs picks this.
5	Box 6	Yes. AAS comes first, and CPCTC after it. AAS proves the triangles congruent. After that, CPCTC gives $BC \cong EF$, a matching pair that is not a given fact.	“No. The reason for $BC \cong EF$ must be AAS.” goes to box 4. A student who uses a criterion as the reason for one pair of parts picks this.
6	Box 3	No. It needs one more row: $\angle A \cong \angle D$, by CPCTC. The proof has to reach $\angle A \cong \angle D$. The congruence is only the middle step. The last row is $\angle A \cong \angle D$, by CPCTC.	“Yes. It shows the triangles are congruent.” goes to box 7. A student who stops once the triangles are congruent picks this.
	Box 4	SSS. Three pairs of sides. The facts are three pairs of sides, so SSS proves the triangles congruent. CPCTC only comes after that.	“CPCTC. The three sides match.” goes to box 2. A student who still uses CPCTC to prove triangles congruent picks this.
	Box 7	$AC \cong DF$, by CPCTC. ASA used $\angle A$, AB and $\angle B$. The new facts are $AC \cong DF$, $BC \cong EF$ and $\angle C \cong \angle F$.	“ $AB \cong DE$, by CPCTC.” goes to box 5. $AB \cong DE$ is one of the facts ASA used. A student who still does not track them picks this.

How to check any box. A row that says $\triangle ABC \cong \triangle DEF$ needs a criterion: SSS, SAS, ASA or AAS, whichever the given facts are. A row about one pair of parts needs CPCTC, and only after the triangles are proved congruent. A proof may not use the fact it has to prove, and it ends with that fact.

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.