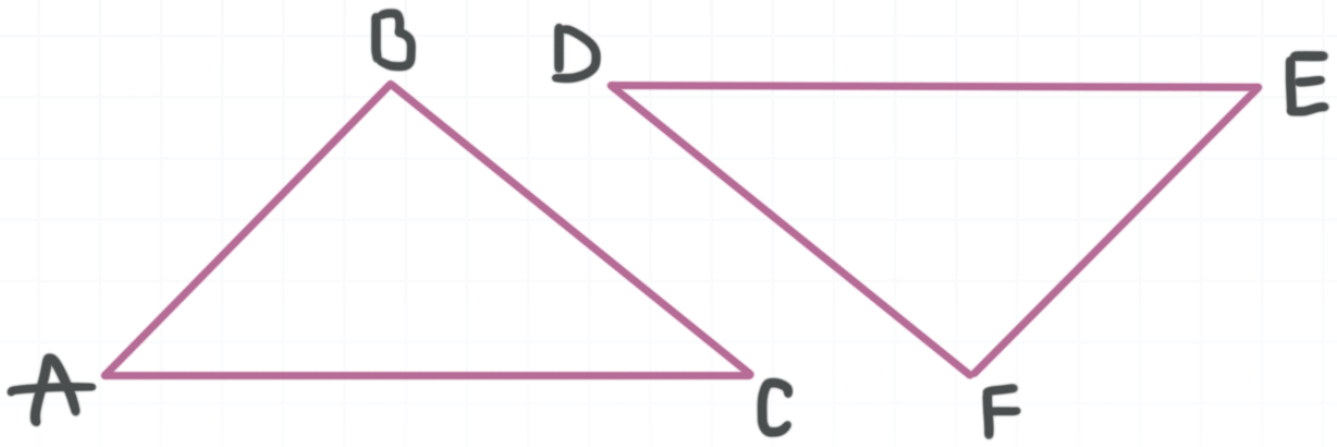
Topic: CPCTC

Question: Given that $\triangle ABC \cong \triangle EFD$, which of these can be proven by CPCTC?



Answer choices:

A $\angle A \cong \angle D$

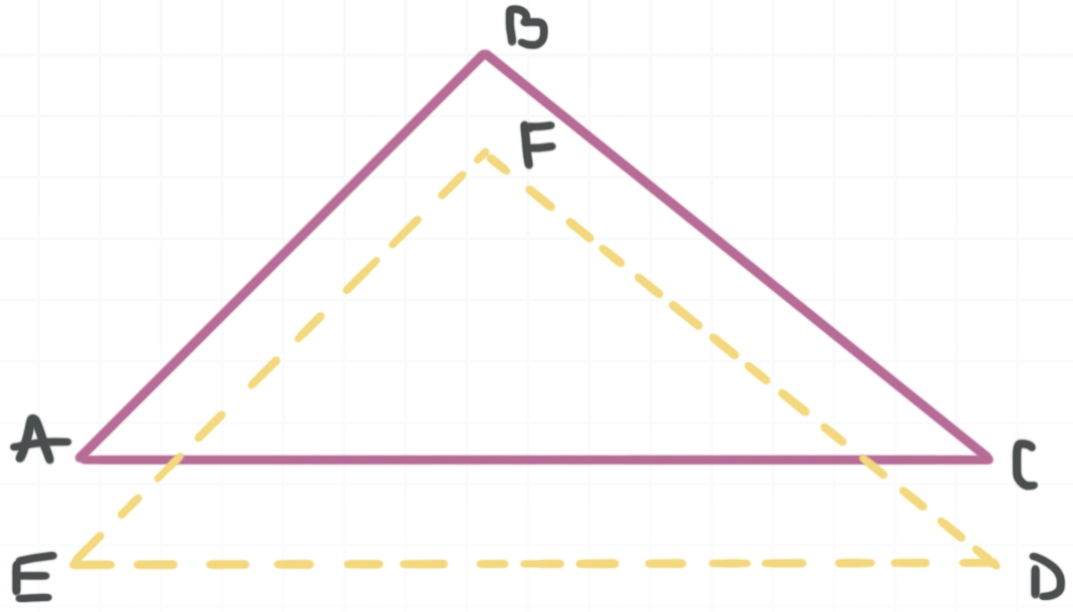
B $\overline{AC} \cong \overline{ED}$

C Both A and B

D Neither A nor B

Solution: B

We know that $\triangle ABC \cong \triangle EFD$.



The order of the letters for the vertices tells you that the triangles match up as shown above, and the congruences of angles are as follows:

$$\angle A \cong \angle E$$

$$\angle B \cong \angle F$$

$$\angle C \cong \angle D$$

That rules out answer choice A, which also rules out answer choice C.

Likewise, the congruences of sides are as follows:

$$\overline{AB} \cong \overline{EF}$$

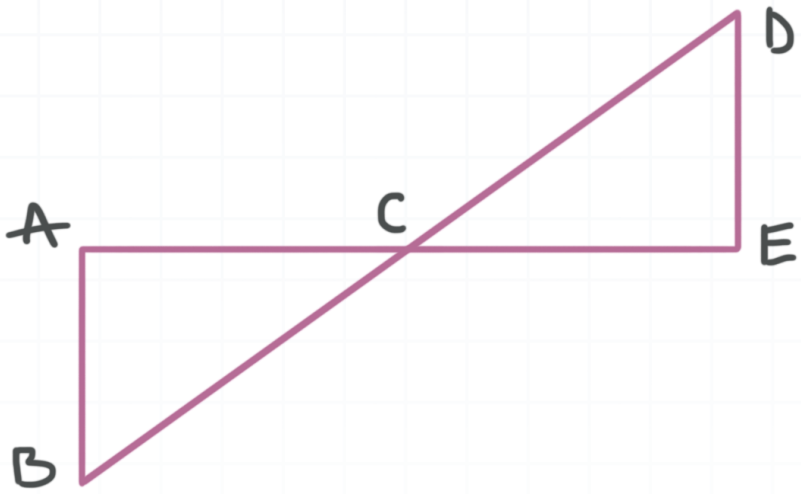
$$\overline{BC} \cong \overline{FD}$$

$$\overline{AC} \cong \overline{ED}$$

This third side congruency statement matches answer choice B.

Topic: CPCTC

Question: We've written a proof showing that $\overline{AB} \cong \overline{ED}$ in the figure. Which column in the table shows the last three steps of the proof?



A	B	C	D
CPCTC	Vertical angles are congruent	CPCTC	Vertical angles are congruent
Vertical angles are congruent	CPCTC	ASA	ASA
ASA	ASA	Vertical angles are congruent	CPCTC

Answer choices:

A Column A

B Column B

C Column C

D Column D

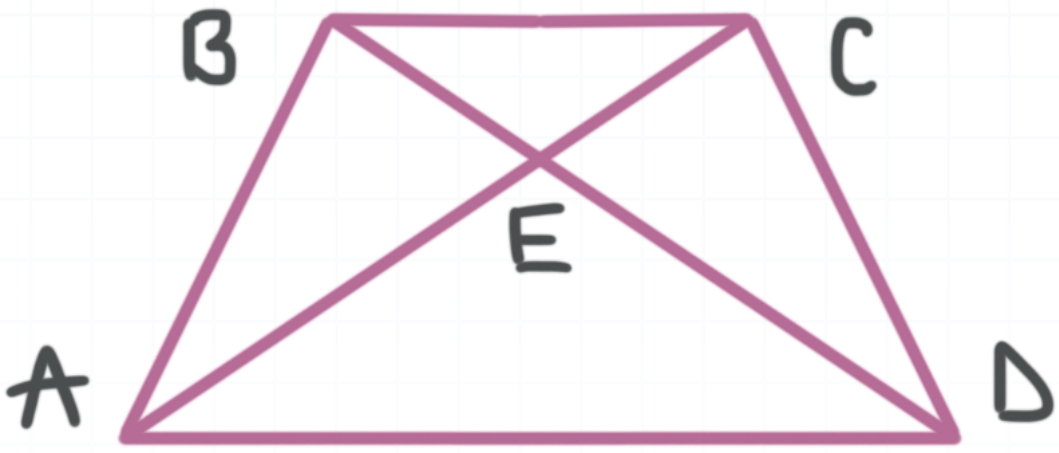
Solution: D

The proof is using ASA to prove triangles congruent. CPCTC is used only after triangles have been proven congruent, which means it must come after ASA.

Only answer choice D has ASA and CPCTC in the correct order.

Topic: CPCTC

Question: Given trapezoid $ABCD$, and $\overline{AC} \cong \overline{BD}$ and $\angle DAC \cong \angle BDA$, assuming we're trying to prove that $ABCD$ is isosceles, which is the missing step in the proof?



1. Segment *AC* congruent to segment *BD*	Given
2. Segment *AD* congruent to segment *AD*	Reflexive
3. Angle *DAC* congruent to angle *BDA*	Given
4	
5. Segment *AB* congruent to segment *CD*	CPCTC
6. Trapezoid *ABCD* is isosceles	Definition of isosceles trapezoid

Answer choices:

A $\triangle BAD \cong \triangle CAD$ by SAS

B $\triangle ABE \cong \triangle DCE$ by ASA

C $\triangle BCA \cong \triangle CBD$ by AAS

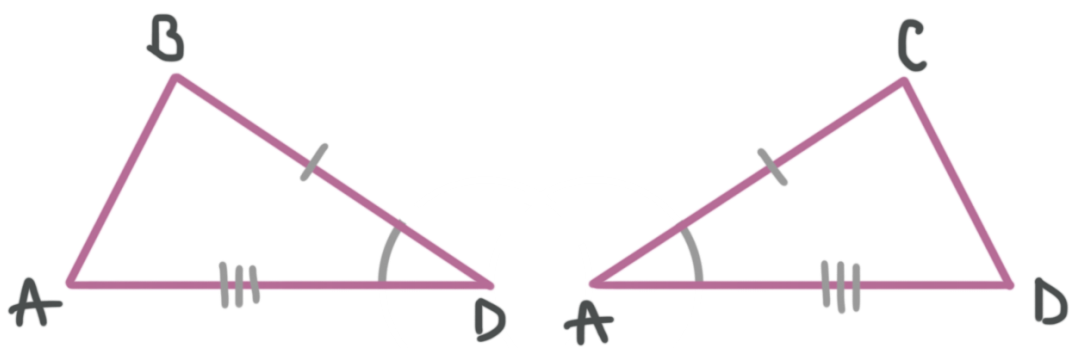
D $\triangle ABD \cong \triangle DCA$ by SAS

Solution: D

Answer choice A is ruled out, because it indicates that sides $\overline{BA}$ and $\overline{CA}$ are congruent. It's clear from the figure that that's false.

Answer choice B is ruled out because a proof of triangle congruence by ASA would include two statements of congruence of angles, whereas the given proof includes just one statement of congruence of angles. Similarly, answer choice C is ruled out because a proof of triangle congruence by AAS would include two statements of congruence of angles.

Now we'll investigate answer choice D. Separating the overlapping triangles $\triangle ABD$ and $\triangle ACD$ and marking the congruent parts indicated in the first three steps of the proof gives us



It's clear from this figure that the triangles are congruent by SAS. In $\triangle ABD$ the included angle of sides $\overline{BD}$ and $\overline{AD}$ is $\angle BDA$, and in $\triangle ACD$ the

included angle of sides $\overline{AC}$ and $\overline{AD}$ is $\angle DAC$. This means that answer choice D is indeed correct.