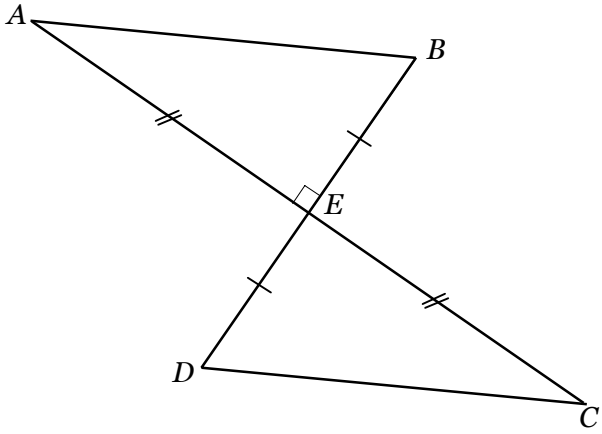
Geometry check-ups: Sample answers (annotated)

http://topdrawer.aamt.edu.au/Geometry/Misunderstandings/Similar-or-congruent/What-is-wrong-with-this-proof

1. In the diagram below, $AE = EC$ and $BE = DE$. $\angle AEB = 90°$.



(a) Prove that $\Delta ABE \equiv \Delta CDE$.
(b) Hence or otherwise prove that $AB \parallel DC$.

a) In △ABE and △DEC

A good start. Always do the introduction this way

If you plan to use RHS, put the information into your proof in that order. It will remind you to look for the hypotenuse.

1. AE = EC (given) ✓
2. BE = ED (given) ✓
3. ∠AEB = ∠DEC (vertically opposite) ✓
= 90° (given)

correct order here.

∴ △ABE ≡ △CDE (~~RHS~~) SAS

You do not have the hypotenuses in your proof. This is not the correct test.

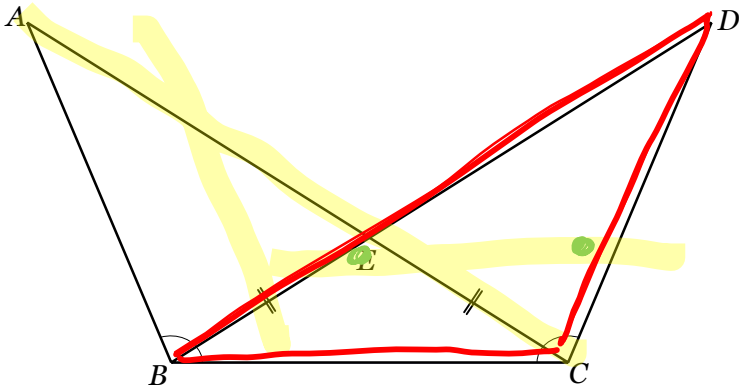
b) AB = DC (matching sides of congruent △'s) ✗

You needed: ∠BAC = ∠ECD (matching angles of congruent △'s)
but these are alternate
∴ AB ∥ DC (alternate angles equal)

∴ AB ∥ DC

equality does not mean that the lines are parallel
To prove parallel you must first have angles equal

2. In the diagram below, $\angle ABC = \angle DCB$ and $BE = EC$.



Note that $\angle EBC = \angle ECB$ (opposite equal sides in isosceles ΔBEC)
Now you can use the AAS test.

(a) Prove that ΔABC is congruent to ΔDBC.
(b) Hence prove that AE = ED.

You need to introduce the triangles first :-
In ΔABC and ΔDBC

a) $\angle ABC = \angle DBC$ (given)
incorrectly named. Be careful here: $\angle DCB$

$BE = EC$ (given)
These lengths are not sides of the triangles you are proving congruent. It is not relevant here.

BC is Common ✓

Again, these are not sides of the triangles you are trying to prove congruent. In order to see this, colour the triangles in some way at the start. I have done this for you.

After proving congruence with AAS, this part should look like this: $AC = DB$ (matching sides of congruent Δ's)
$AE + EC = DE + EB$ (A, E, C and D, E, B collinear)

$\therefore \Delta ABC \equiv \Delta DBC$ (SAS) ✗
- not in matching order
- You need ΔDCB

You have selected the incorrect test. You need AAS.

b) $AE = DE$ (matching sides of congruents Δ's) ✗

$\therefore$

but $EC = EB$ (given)
$\therefore$ $AE = DE$.