4) Prove $\overline{AB} \cong \overline{BC}$

Statements	**Reasons**	(Comments)
$\overline{AB}$ = x+4 $\overline{BC}$ = 2x $\overline{AC}$ = 16	Given	Great
$\overline{AB} + \overline{BC} = \overline{AC}$	Segment Addition	You had the correct idea. But you have to add the SEGMENTS, not their measurements first
x+4+2x = 16	Substitution	NOW you have the correct statement. We can now say this because we SUBSTITUTE the measurements in for their respective segments
3x=12	Addition POE	You have to show <u>each</u> algebra step
x = 4	Division POE	GOOD!
(4)+4 = 8 2(4)=8	Substitution	GOOD!
$\overline{AB} = 8 \quad 8 = \overline{BC}$	Transitive	GOOD!
$\overline{AB} \cong \overline{BC}$	If two segments have the same measure, then they are congruent (by definition)	You have shown both segments =8, but you have been asked to prove the two segments are CONGRUENT. So your last statement should be exactly that.

#9 Prove $\angle BCD \cong \angle A$

Statement	Reason	Comment
$\angle A$ Is a right angle $\overrightarrow{CE}$ *bisects* $\angle BCD$ $\angle BCD = 45°$	Given	GOOD!
$\angle BCD \cong \angle DCE$	When a ray bisects an angle, the two resulting angles are congruent (by definition)	GOOD!
$\angle DCE = 45°$	If two angles are congruent then they have the same measure (by definition)	We need to establish that the measure of both angles are 45° so that we can add them to get a sum of 90°
$\angle BCD + \angle DCE = \angle BCE$	Angle addition	The final focus is on the congruence of $\angle BCE$, but all we have talked about so far is the smaller angles. So we have to transition from the smaller angles to the bigger angle.
$45° + 45° = \angle BCE$	Substitution	NOW we can substitute the **values** of the smaller angles into the previously established relationship
$90° = \angle BCE$	Addition	We have to make the connection that $\angle BCE$ is congruent to a right angle A. To approach this, we must make the connection with 90°
$\angle A = 90°$	If an angle is a right angle then it measures 90° (by definition)	To accommodate your last statement reason, I added in that $\angle A$ was 90°. Language is very important. If you are going to claim congruence, you must establish **both** have the same measure (90°) OR **both** are right angles. It is not enough to establish one is a right angle, and the other is 90°.
$\angle BCD \cong \angle A$	If two angles have the same measure, then they are congruent (by definition)	GOOD!

#10: Prove $\angle CEA\ is\ a\ right\ angle$

Statements	Reasons	Comments
AC bisects$\angle BAD$ AE bisects$\angle DAF$ $\angle BAF = 180°$	Given	
$\angle BAC \cong \angle CAD$ $\angle DAE \cong \angle EAF$	When a ray bisects and angle, the resulting two angles are congruent (by definition)	You have to establish congruence before you can label them BOTH with "x"
$\angle BAC + \angle CAD + \angle DAE + \angle EAF = \angle BAF$	Angle addition	You must establish the **pieces** we have been discussing add up to the **whole**, if you plan to discuss the **whole** in the next statement
$\angle BAF\ is\ a\ straight\ angle$	Assumed from diagram	If you want to move into the fact that an angle is 180°, you have to explain HOW you know it is 180°. You know it is 180° because it is a straight line. HOW do you know it is a straight line? You are allowed to look at the **diagram and assume it.**
$\angle BAF = 180°$	If an angle is a straight angle, then it has a measure of 180 (by definition)	NOW you can say it's 180°.
$\angle BAC \cong \angle CAD = x$ $\angle DAE \cong \angle EAF = y$	Labeling diagram	If you want to use x and y in your proof, you have to establish what you are labeling
$x + x + y + y = 180°$	Substitution (4 times)	Now that your variables are established, you may **substitute** them in to use them.
$2x + 2y = 180°$	Addition	You **must** describe each algebraic step.
$x + y = 90°$	Division POE	Great job recognizing this!
$\angle CAE = \angle CAD + \angle EAD$	Angle Addition	You must establish the **pieces** we have been discussing add up to the **whole**, (since the **whole** is the focus of the proof)
$\angle CAE = x + y$	Substitution	
$\angle CAE = 90°$	Transitive POE	
$\angle CEA\ is\ a\ right\ angle$	If an angle has a measure of 90°, then the angle is a right angle (by definition)	It is not enough to establish $\angle CAE = 90°$. You were asked to prove "right angle" not 90°. So you cant stop at 90°.

#11a) Prove $m\angle 1 = m\angle J + m\angle H$.

Statements	Reasons	Comments
$m\angle J + m\angle H + m\angle JKH = 180°$	Given	
$\angle JKH + \angle 1 = \angle JKM$	Angle Addition	We have to make the connection between the **parts** and the **whole**.
$\angle JKM\ is\ a\ straight\ angle$	Assumed from diagram	We can't claim the measure is 180 until we establish the angle is straight.
$\angle JKM = 180°$	If an angle is a straight angle, then the angle measures 180°	
$\angle JKH + \angle 1 = 180°$	Transitive POE	Careful! You claimed, "**assume**" here. But you can't technically assume 180. You CAN assume straight lines and angles, which is why we had to establish straight angle for step 3.
$\angle \boldsymbol{JKH} + \angle 1 = \angle J + \angle H + \angle \boldsymbol{JKH}$	Transitive POE	GOOD!
$m\angle 1 = m\angle J + m\angle H$	Subtraction POE	When you **subtract** congruent parts from both sides of the equal sign, you maintain **equality**!