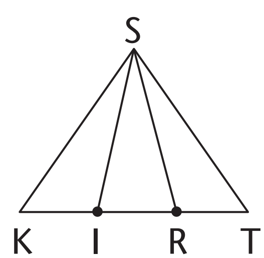
Girls Get Curves

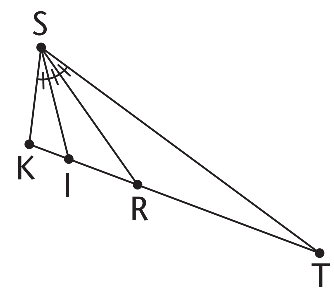
Drawing Conclusions – Free Worksheet!

(as promised on p. 43 of *Girls Get Curves*)

As we saw on p. 43 of *Girls Get Curves*, a great way to separate what we *know* about a diagram from what we are *assuming* about it is by drawing a second diagram that still satisfies all the facts we've been given – but that doesn't fit what we've assumed! For example, say we're given the SKIRT diagram below, and that $\angle KSI \cong \angle ISR \cong \angle RST$ (so all three small upper angles are congruent).

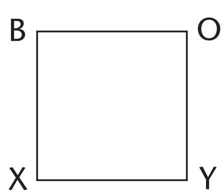
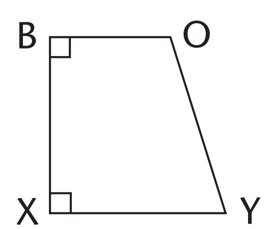


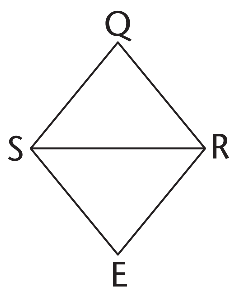
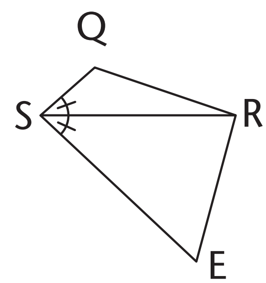
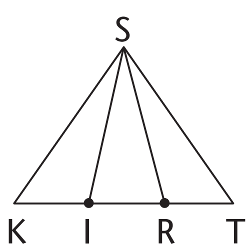
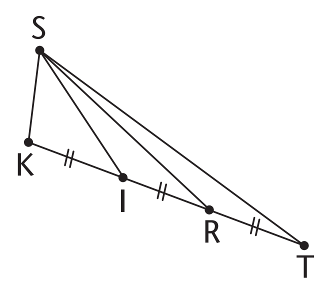
It might *seem* like $KI = IR = RT$, but we can't assume it! Below is a diagram that we could draw ourselves, which satisfies the Givens (and everything we can assume from the diagram).



Now it’s pretty clear that those little segments aren’t necessarily congruent just because the angles are!

Here are some more examples:

We’re given this diagram and info:	**Should we assume…**	**Here’s another diagram that *also satisfies the givens*!**
Given: $\angle B$ and $\angle X$ are right angles 	… $\angle Y$ is a right angle? Nope, not enough information to guarantee it!	 By simply extending the $\overline{XY}$ segment even just a tiny bit, it’s clear that $\angle Y$ (and $\angle O$) don’t have to be right angles at all.

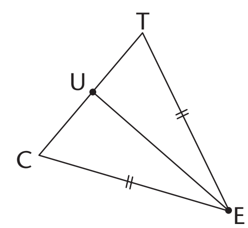
Given: $\overrightarrow{SR}$ bisects $\angle QSE$ 	**Should we assume…** … $\overrightarrow{RS}$ bisects $\angle QRE$? Nope, not enough information to guarantee it!	It's totally possible for the angles on the left to be congruent ($\angle QSR \cong \angle RSE$) but for the angles on the right *not* to be ($\angle QRS$ & $\angle SRE$). Looking below, $\overrightarrow{RS}$ sure doesn't seem to bisect $\angle QRE$ anymore! 
Given: $\overline{KI} \cong \overline{IR} \cong \overline{RT}$ 	**Should we assume…** … $\angle KSI \cong \angle ISR \cong \angle RST$? Nope, not enough information to guarantee it!	 Again, even if the "real" measurements aren't this extreme, we can see that just because those segments are congruent, doesn't mean the angles have to be!

See how easy it is to assume things? Appearances aren't everything…

Let's practice!

DOING THE MATH

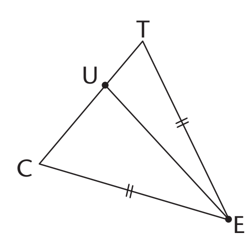
Given the diagram and information, draw another diagram that also fits the requirements but that *doesn't* fit the assumption we might make. I'll do the first one for you.



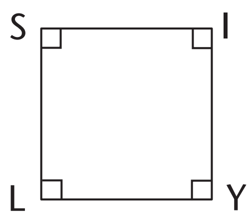
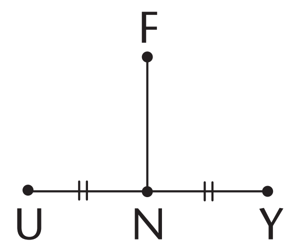
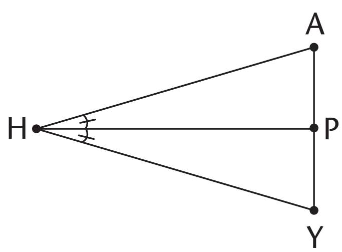
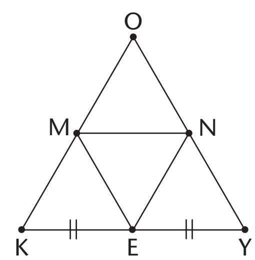
1. Given: $\overline{CE} \cong \overline{TE}$. Why can't we assume $\overrightarrow{EU}$ bisects $\angle CET$?

<u>Working out the solution:</u> Because of the way it's drawn, it *looks* like $\overrightarrow{EU}$ bisects $\angle CET$ on the diagram; the angles $\angle CEU$ and $\angle UET$ sure look congruent, right? (Remember, "$\overrightarrow{EU}$ bisects $\angle CET$" gives the same info as "$\angle CEU \cong \angle UET$.") But all we're *actually* told is that the two *sides* are congruent - the truth is, the point U could be anywhere on the segment $\overline{CT}$, which would make it obvious that those two angles don't have to be congruent at all. And none of that even affects our given: $\overline{CE} \cong \overline{TE}$.

Let's draw this and show what we'd be assuming about the angles didn't have to be true at all!



Answer: (See the diagram to the right)

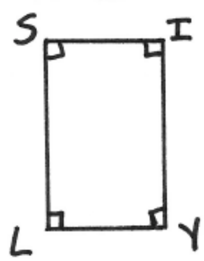
<table>
<tr>
<td>2. Given: $\angle S, \angle I, \angle L, \angle Y$ are all right angles. Why can't we assume $\overline{SL} \cong \overline{LY}$?

</td>
<td>3. Given: $\overline{UN} \cong \overline{NY}$. Why can't we assume $\overline{FN}$ is the perpendicular bisector of $\overline{UY}$?

</td>
</tr>
<tr>
<td>4. Given: $\overrightarrow{HP}$ bisects $\angle AHY$. Why can't we assume P is the midpoint of $\overline{AY}$?

</td>
<td>5. Given: E is the midpoint of $\overline{KY}$. Why can't we assume M is the midpoint of $\overline{OK}$?

</td>
</tr>
</table>

Because these are drawings, my answers will be at least a little different from yours. Try them on your own first, and then make sure you understand the ones I've done for you! Scroll down for the answers…

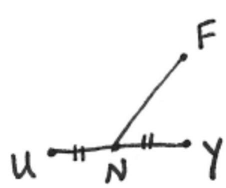
(no peeking till you're done!)

ANSWER KEY FOR THIS ONLINE WORKSHEET

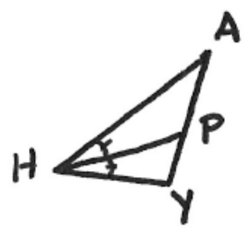
2. We can't assume that $\overline{SL} \cong \overline{LY}$, even though it appears that way. After all, we could draw the below diagram and it still fits the givens – it's a bit of an exaggeration, but all four angles are still right angles! (We'll see more about rectangles in the Quadrilateral chapters – but a rectangle like the one below totally fits the givens!)



3. We can't assume $\overline{FN}$ is the perpendicular bisector of $\overline{UY}$, because even though we have the bisector part ($\overline{UN} \cong \overline{NY}$), that vertical segment, $\overline{FN}$, could be a little titled and we might not notice it (what if $\angle FNU$ is 90.001°, for example?). We just can't trust how much it looks like 90°, even if we measured it with a protractor. So even with these same givens, it could totally be the case that $\overline{FN} \not\perp \overline{UY}$. For example, we could draw this below (exaggerated) diagram and it still fits all the givens!



4. Just because $\overrightarrow{HP}$ bisects $\angle AHY$, doesn't mean we can assume that $AP = PY$! In other words, we can't assume that P is the midpoint of $\overline{AY}$. Just like in the first SKIRT example back on page 1 of this worksheet, just because two angles are congruent doesn't mean we can assume the segments opposite those angles are also congruent! After all, look at what we can draw that also satisfies the Givens:



5. Below, just because E is the midpoint of $\overline{KY}$ doesn't mean we can assume that M is the midpoint of $\overline{OK}$. Look at what we can draw that also satisfies the Givens!

Yep, that makes it pretty clear that we shouldn't be assuming anything about M being a midpoint. ☺

With this kind of practice, you'll be better able to catch yourself before assuming anything you shouldn't from diagrams… great job!