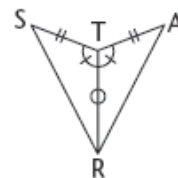# Girls Get

Curves

Solution Guide for Chapter 8

Here are the solutions for the "Doing the Math" exercises in *Girls Get Curves*!

DTM from p. 124-125

2. For the STAR diagram, finish this statement: "$\triangle TSR \cong ?$"

Hm, those two triangles are definitely congruent – the markings show us that we have SAS. So we just need to make sure we match up the correct corresponding letters between our two triangles! Because T and R are actually <u>on</u> the line of symmetry of this diagram between the two triangles, it looks like the T corresponds with T, and R corresponds with R. Then all that's left is that S corresponds with A! So that means we would write: $\triangle TSR \cong \triangle TAR$.

Answer: $\triangle TAR$

3. For the STAR diagram, if we were told that $\angle SRT \cong \angle ART$, then which shortcut(s) (besides SAS) could we use to prove that $\triangle STR \cong \triangle ATR$?

Hm, if we were told that $\angle SRT \cong \angle ART$, then looking up and down that center line, $\overline{TR}$, we'd see that we have ASA. Are there any other shortcuts we could use? Well, we didn't get an extra side, so we know we didn't get SSS, but how about AAS? Yep! Starting at the bottom (at R), we have A, then A up top, and then those double kitty scratch marks give us the S we need to make AAS! (We could also call this SAA.)

Answer: ASA and AAS (SAA) both would work

Use the LDY-BUG diagram to answer questions #4–7.
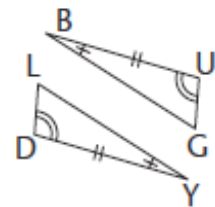
4. Which point in $\triangle BUG$ corresponds to the point Y in $\triangle LDY$?

Hm, well the point Y is touching the angle that has a single kitty scratch mark on it, and in the other triangle, the same is true for the point B!

Answer: B

5. Which point in $\triangle BUG$ corresponds to the point L in $\triangle LDY$?

Well, L is the point that is touching the only angle in $\triangle LDY$ that has NO marking on it – and that is also true for the point G in $\triangle BUG$.

Answer: G

6. Which segment in △BUG corresponds to the $\overline{YL}$ in △LDY?

Now we're looking for a corresponding segment. Well, we learned in the previous two exercises that Y corresponds to B, and L corresponds to G. And that means $\overline{YL}$ must correspond to $\overline{BG}$. (Note: Some teachers might accept the answer $\overline{GB}$, since it refers to the same segment, and for segment names, the order of the letters technically doesn't matter. But for an exercise like this, where it's all about matching up all the corresponding stuff, why not just match up the letters in segment names, too? I thought you might see it my way.)
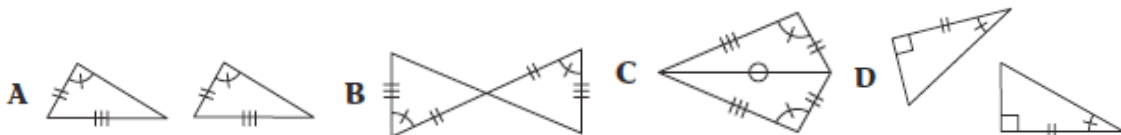
Answer: $\overline{BG}$

7. Which angle in △BUG corresponds to ∠YLD in △LDY? (Use 3 letters in the angle name, in the correct order.)

We want to name the corresponding angle with the same order… hm. Looking at the diagram, ∠YLD "starts" at the single kitty scratch point (Y), "goes" to the unmarked angle (at the vertex L), and "ends" at the double arc point (D). In △BUG, that same journey would "start" at B, "go" to G, and then "end" at U. So that order is B-G-U, in other words, we call the angle ∠BGU. And we've learned that ∠BGU corresponds to ∠YLD. Nice!

Answer: ∠BGU

Use the markings on the diagrams A–D below to answer questions #8–12. Possible answers are: A, B, C, D, None, or *more* than one letter.

8. Which triangle pairs can be proven ≅ using SSS, if any?

For SSS, we need all three pairs of sides to be marked as congruent. Do any of these diagrams have that? Yep! C does, and that's the only one.

Answer: C

9. Which triangle pairs can be proven ≅ using SAS, if any?

To use SAS, we need corresponding angles to be between two corresponding congruent sides. Where do we see that? In B, we can see that pretty clearly, and in C, we also have it! None of the others work.

Answer: B and C

10. Which triangle pairs can be proven ≅ using ASA, if any?

This time the corresponding congruent segments must be between two sets of corresponding congruent angles. In D, we clearly have that situation. However, we also have it in B, because since vertical angles are always congruent, there's a set of corresponding congruent angles that aren't marked!

Answer: B and D

11. Which triangle pairs can be proven ≅ using AAS, if any?

Hm, two angles with a segment NOT in between them? This one is a little tricky. In B, we have the vertical angles, the single-kitty-scratch marked angles, and also the triple-kitty-scratch marked segments. See them? And that follows the order! (We can just ignore the double kitty scratch segments – we don't need them for AAS here.)

So we know **B** works. Do any others? Well… there's sort of a bonus answer here. See, because the angles in every triangle always add up to 180, since in **D**, we have two angle pairs already marked as congruent, that means their third, unmarked angles must ALSO be congruent. And then we definitely have AAS. But if you didn't see that one, it's totally fine – it's kind of advanced!!

Answer: B (and D, too)

12. Which triangle pairs cannot be proven ≅, if any?

We've already shown that the triangle pairs in B, C, and D can be proven congruent with our various shortcuts. But what about the triangle pairs in A? We are only given two
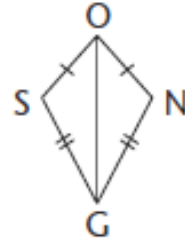
segments with an angle NOT in between. That's the configuration SSA, or ASS. Oops!
This is the bad word, and we know that one doesn't work.

Answer: A

DTM from p. 138-140

2. See the SONG diagram to the right.

Given: $\overline{SO} \cong \overline{NO}$, $\overline{SG} \cong \overline{NG}$. Prove: $\triangle SOG \cong \triangle NOG$.

We are given two sets of corresponding congruent sides, and the Reflexive property gives us a third side! That sure sounds like SSS. ☺
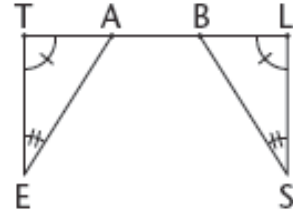
Answer:

♥ Proof ♥

Statements	**Reasons**
1. $\overline{SO} \cong \overline{NO}$	1. Given (Gimmie an "S"!)
2. $\overline{SG} \cong \overline{NG}$	2. Given (Gimmie an "S"!)
3. $\overline{OG} \cong \overline{OG}$	3. Reflexive Property (Gimmie an "S"!)
4. ∴ $\triangle SOG \cong \triangle NOG$	4. SSS (1, 2, 3)

3. See the TABLES diagram to the right.

Given: $\angle E \cong \angle S$, $\angle T \cong \angle L$, and A & B trisect $\overline{TL}$.
Prove: $\triangle TAE \cong \triangle LBS$.

Looks like we've been given two sets of corresponding angles. The fact that A & B

trisect $\overline{TL}$ means that we have some congruent sides: $\overline{TA} \cong \overline{BL}$. Since the side is NOT
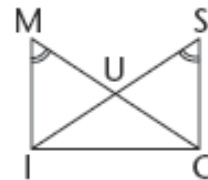
between the two angles, this is AAS. Let's do it!

Answer:

♥ Proof ♥

Statements	Reasons
1. $\angle E \cong \angle S$	1. Given (Gimmie an "A"!)
2. $\angle T \cong \angle L$	2. Given (Gimmie an "A"!)
3. A & B trisect $\overline{TL}$	3. Given
4. $\overline{TA} \cong \overline{BL}$	4. If two points trisect a segment, they divide it into three congruent segments ($\overline{TA}, \overline{AB}, \& \overline{BL}$) (Gimmie an "S"!)
5. $\therefore \triangle TAE \cong \triangle LBS$	5. AAS (1, 2, 4)

4. See the MUSIC diagram to the right.

Given: $\angle M \cong \angle S$, $\triangle IUC$ is an isosceles triangle
with base $\overline{IC}$. Prove: $\triangle MUI \cong \triangle SUC$.

Okay, so we want to prove those two "side" triangles congruent. What do we already know? Well, we've been given one set of congruent, corresponding angles: $\angle M \cong \angle S$. Since $\triangle IUC$ is isosceles with base $\overline{IC}$, this tells us we know that the legs are congruent: $\overline{IU} \cong \overline{UC}$, and also that the base angles are congruent: $\angle UIC \cong \angle UCI$.

Can we use all of this to prove that $\triangle MUI \cong \triangle SUC$? Well, the first two items are indeed corresponding parts of the two triangles, but $\angle UIC$ & $\angle UCI$ are not! If we knew that $\angle MIC$ & $\angle SCI$ were right angles, then we could use complementary angles to get $\angle MIU$ & $\angle SCU$ congruent to each other… but we don't have that. Hm.

But wait! We should ALWAYS look for vertical angles whenever we get a diagram, and we sure have vertical angles here! We know for sure that $\angle MUI \cong \angle SUC$, and that gives us enough to complete our proof – two angles and a side not between means we'll use the AAS shortcut. Nice.

(Also, remember from the footnote on p. 129 that we have options about how to write the vertical angle stuff in the two-column proof.) Let's write it out!


♥ Proof ♥

Statements	**Reasons**
1. $\angle M \cong \angle S$	1. Given (Gimmie an "A"!)
2. $\triangle IUC$ is an isosceles triangle with base $\overline{IC}$	2. Given
3. $\overline{UI} \cong \overline{UC}$	3. If a triangle is isosceles, its legs are $\cong$. (Gimmie an "S"!)
4. $\angle MUI$ & $\angle SUC$ are vertical $\angle$'s.	4. Assumed from diagram *(this step is optional)*
5. $\angle MUI \cong \angle SUC$	5. If $\angle$'s are vertical, then they are $\cong$ $\angle$'s. (Gimmie an "A"!)
6. $\therefore \triangle MUI \cong \triangle SUC$	6. AAS (1, 5, 3) Yippie!

5. See the CHAIRS diagram to the right.

Given: $\vec{AI}$ bisects $\angle CAS$, $\overline{CH} \cong \overline{SR}$, and $\overline{HA} \cong \overline{RA}$.

Prove: $\triangle CIA \cong \triangle SIA$.
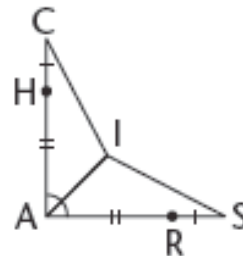
Okay, so it's obvious which two triangles we want to prove are congruent, right? Now, since $\overline{CH} \cong \overline{SR}$ and $\overline{HA} \cong \overline{RA}$, we can just use the Addition property to prove that $\overline{CA} \cong \overline{SA}$, and that gives us an "S"! The Reflexive property tells us (duh) that the shared side, $\overline{AI}$, can be used as another "set of congruent sides," so that gives another "S"! Finally, the fact that $\vec{AI}$ bisects $\angle CAS$ tells us that $\angle CAI \cong \angle SAI$. Since this angle is in between the two sides, we'll use SAS. Let's write it out!

♥ Proof ♥

Statements	Reasons
1. $\overline{CH} \cong \overline{SR}$ & $\overline{HA} \cong \overline{RA}$	1. Given
2. $\overline{CA} \cong \overline{SA}$	2. Addition property: If two congruent segments are added to two other congruent segments, then the sums will be congruent. (Gimmie an "S"!)
3. $\overline{AI} \cong \overline{AI}$	3. Reflexive property (Gimmie an "S"!)
4. $\vec{AI}$ bisects $\angle CAS$	4. Given
5. $\angle CAI \cong \angle SAI$	5. If a ray bisects an angle, then it divides the angle into two congruent angles. (Gimmie an A!)
7. $\therefore \triangle CIA \cong \triangle SIA$	7. SAS (3, 6, 4)