Girls Get Curves

Solution Guide for Chapter 1

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

DTM from p. 2-3

2. I'm late for school when my sister takes forever in the shower.

OK, so to write this in "if…then" form, we have to identify the cause and the effect. Here, the "cause" is your sister taking forever in the shower, so that should go before the "if." And the "effect" is that you are late for school, so that goes after the "then." That's all there is to it!

Answer: <u>If</u> my sister takes forever in the shower, <u>then</u> I'm late for school.

3. I will scream if I hear that song one more time.

Here, the "cause" is pretty obvious, because it's already after the "if"! We just have to write it in the correct order for a proper "if…then" statement.

Answer: <u>If</u> I hear that song one more time, <u>then</u> I will scream.

4. Eating more vegetables makes me feel healthy.

Here, the “cause” is eating more vegetables, right? Because the effect of that is feeling healthy. Nice!

Answer: <u>If</u> I eat more vegetables, <u>then</u> I feel healthy.

5. Odd numbers are not divisible by 2.

Here, the “cause” is “being an odd number,” (I know that’s a little bit weird, but it’s technically correct) and the “effect” of being an odd number is that it’s not divisible by 2. That part makes sense, right? So “not divisible by 2” should definitely go after the “then.”
Notice that we can write the “If…then” statement in two different ways: one with a single “number,” and one with the plural form – “numbers.” I’ll write down both ways (they are both correct).

Answer: <u>If</u> a number is odd, <u>then</u> it is not divisible by 2.
(or) <u>If</u> numbers are odd, <u>then</u> they are not divisible by 2.

DTM from p. 5

2. Given: All Barbies are dolls. All dolls are creepy.

Can we conclude anything new from this? Let’s see, if we write them into “if…then” form, maybe it’ll be clearer!

“All Barbies are dolls” can be written as: *If it’s a Barbie, then it’s a doll.*

“All dolls are creepy” can be written as: *If it’s a doll, then it’s creepy.*

Now it’s easier to see the chain of logic, that yes, leads us straight from Barbie to creepiness! After all, according to our given: if it’s a Barbie, then is HAS to be a doll, and if it’s a doll, then it HAS to be creepy – therefore, if it’s a Barbie then it has to be creepy – so, <u>all Barbies are creepy</u>. ☺

Answer: Therefore, all Barbies are creepy.

3. Given: All puppies like bones. Sparky likes bones.

At first, it might seem like we can take these two statements and say something like "Sparky is a puppy." But does the logic lead us there? Rewriting our givens into "if…then" form, we get:

If it's a puppy, then it likes bones.
If it's Sparky, then he likes bones.

Nope, one doesn't chain-link us to the other. And besides, we can come up with a counterexample: using these same givens, Sparky could totally be a skunk or a bird or something – or, um, something else that likes bones? The point is – our givens don't FORCE Sparky to be a puppy, so we can't conclude it - or anything else for that matter!

Answer: No conclusion possible.

4. Given: All fruit grows on trees. All apples are fruit.

Rewriting this into "if…then" form, we get:

If it's fruit, then it grows on trees.
If it's an apple, then it's fruit.

We see "fruit" twice – and if we start off with an apple, we can follow the logic to "grows on trees!" See, if it's an apple, then MUST be fruit, and if it's fruit, then it MUST grow on trees. So we can safely conclude that if it's an apple, it grows on trees!

Answer: Therefore, all apples grow on trees.

5. Given: All aliens speak Martian. Debbie speaks Martian.

Can we conclude anything new from these givens? Hm, it's tempting to conclude something like "Debbie is an alien." But let's look at the "if…then" forms:

If it's an alien, then it speaks Martian.
If it's Debbie, then she speaks Martian.

Just like with the Sparky example (#3), both "then" parts are the same – speaking Martian. So our two statements just don't link together. Besides, why couldn't Debbie be a human that just so happens to speak Martian? Our givens totally allow for that! (And how cool for Debbie…) ;)

Answer: No conclusion possible.

DTM from p. 8

2. If you tweet, you're bored.

The converse is just switching the "if" and "then" parts – like your Converse shoes in some neat-o dance, right? The inverse is the negative of the original statement, and the contrapositive is the negative of the converse! (And notice that the contrapositive gives the *same information* as the original statement.)

So we get:

Answer:
Converse: If you're bored, then you tweet.
Inverse: If you don't tweet, then you're not bored.
Contrapositive: If you're not bored, then you don't tweet.

3. If she misses the bus, then she's not in a good mood.

Notice that when we make the "good mood" part negative, we'll actually just be taking out the word "not" – because the negative of a negative is positive! (And notice that the contrapositive gives the *same information* as the original statement.)

Answer:
Converse: If she's not in a good mood, then she misses the bus.
Inverse: If she doesn't miss the bus, then she's in a good mood.
Contrapositive: If she's in a good mood, then she doesn't miss the bus.

4. If I stay up on Wednesday night, then I'm tired on Thursday.

For this one, we'll have to play around with the verb tenses a little bit, and that's okay. It's all about keeping the logic pure, not the strict form of the verb. Also notice that if the original statement is true, then the contrapositive, as always, is the ONLY one that is necessarily true. The converse and inverse might or might not be true!

Answer:
Converse: If I'm tired on Thursday, then I stayed up late on Wednesday night.
Inverse: If I didn't stay up late on Wednesday night, then I'm not tired on Thursday.
Contrapositive: If I'm not tired on Thursday, then I didn't stay up late on Wednesday night.

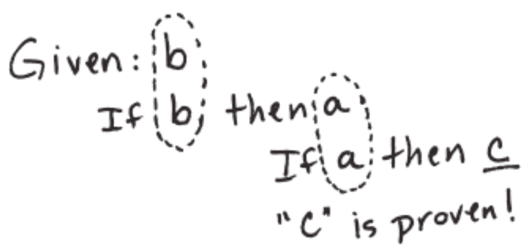
Note: for the inverse of this problem, we could also use "don't" instead of "didn't" – either one is fine!

DTM from p. 15-16

2. Rules: **If *a*, then *c*** and **If *b*, then *a***.
Given: ***b***. Prove: ***c***.

Starting with the Given, "*b*," can we use our Rules to chain-link our way to *c*? Sure! The Rule "**If *b*, then *a***" takes us from ***b*** to ***a***, and then the Rule "**If *a*, then *c***" takes us from ***a*** to ***c***. So we can link from *b* to *a* to *c*. There you have it!

Answer: (see below)



3. Rules: **If Paige is happy, then Rachel is happy.**
If Quinn is happy, then Paige is happy.

Given: **Rachel isn't happy**. Prove: **Quinn isn't happy.**

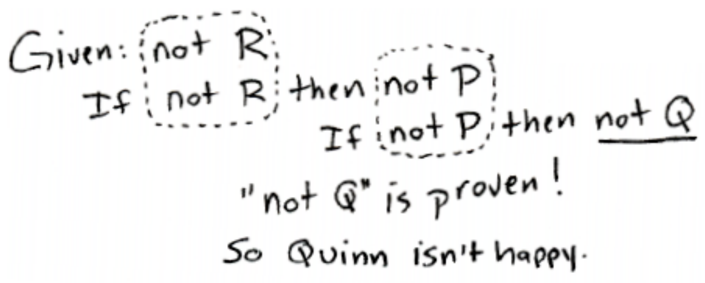
Okay, we need to use our Rules to chain-link from Rachel not being happy, to Quinn not being happy. First, let's rewrite all this info using the variables *P*, *Q* & *R*.

Rules: **If P, then R.**
If Q, then P.

Given: **not R**. Prove: **not Q.**

Hm, neither of our Rules start with "not R" – but this is when contrapositives come in handy! See, because contrapositives are ALWAYS the same information as the original statement, we can confidently use them wherever we might want to use the original statements. Here, the contrapositive of "If P, then R" is **If not R, then not P**.
Great! We have our first chain link. Now, to get from "not P", we just need the contrapositive of our OTHER Rule: "If Q, then P" becomes **If not P, then not Q**. And we've successfully linked our way to the answer. ☺ (Remember, we can ONLY do this using contrapositives – not converses or inverses, because they are not the same information as the original statement and we can't be sure they are even true.)

Answer: (see below)



4. Rules: **If Kala doesn't wear pink, then Lea wears pink.**
If Mindy doesn't wear pink, then Kala doesn't wear pink.
Natalie wears pink ⇔ Mindy wears pink.

Given: **Lea doesn't wear pink.**
Prove: **Natalie wears pink.**

First, let's rewrite this all in terms of the variables K, L, M, and N, and we'll write the biconditional statement into its two parts:

Rules: **If not K, then L.**
If not M, then not K.
If N, then M.
If M, then N.

Given: **not L**. Prove: **N**.

Phew – so much to do even in the set-up! Okay, now let's see… we want to go from "not L" to "N," huh? Well, we don't have any Rules starting with "not L," but the contrapositive of "If not K, then L" is **If not L, then K.** Great! So that will be our first link. We only have one Rule that has "K" in it, and we can use the contrapositive of that one, too: "If not M, then not K" has this contrapositive: **If K, then M**. Nice! And now, we can use the Rule **If M, then N** to link to our final conclusion. Done!

Answer: (see below)