Transcript for *I am Marie Curie* by Brad Meltzer (Dial Books for Young Readers, an Imprint of Penguin Random House)

Introduction (approximately 0:00 – 4:19)

Hi everyone! It's Colleen from the KU Natural History Museum, and I am so excited that you are here today for Story Book Science! Today, I'm so excited to share with you the story of Marie Curie, but I do want to wait for some folks to join us before we get started.

So while we wait, I want to talk about some of the things that are really important to understand, for us to understand all of the things that Marie Curie researched and studied and shared with the world. So one of the things we need to understand to understand Marie Curie's work is matter.

So what's matter? Matter is anything that has mass and takes up space. So when we think of matter we can think of things that we interact with. So for example, I'm sitting on a chair right now. And this chair, it has mass, and it takes up space. So it's matter! The air that's all around me. It has mass, and it takes up space. So the air around me is matter too! I have mass, and I take up space. So I'm matter! What about you? Do you have mass, and do you take up space? Yes! So you are matter as well! Everything is matter. Alright?

Now matter is made up of these really tiny particles called atoms, and atoms are very, very small. So we can't see them with our naked eye. So I have this illustration of what an atom looks like to share with you. Now this atom, it has a center, and that center is called the nucleus. And in the nucleus, there are protons and neutrons. And then surrounding the nucleus, so moving around and orbiting around that center of the atom, are electrons. Alright?

So matter is anything that has mass and takes up space, and matter is made up of atoms. Alright? So I want you to remember that because we'll talk about it a little after the reading.

Now it looks like folks have joined us. So let's go ahead and get started!

First and foremost, we need to go over our guidelines for Story Book Science! What that means is we're not in the museum, but we are going to follow museum rules. So if you have a question or you have a comment that you want to write, please feel free to do so! But make sure that you use kind and considerate words. If you respond to someone's question or comment, you also need to use kind and considerate words. We're not in the museum, but just like if we were, we want to make sure that we are making this a safe place that is open and welcome to everyone. So can you use those kind and considerate words for me? Excellent! Thank you so much! Alright!

So welcome to Story Book Science! Today, I am reading the book *I am Marie Curie*. This book is written by Brad Meltzer, and it's illustrated by Christopher Eliopoulos. And it is published by Dial Books for Young Readers, which is an imprint of Penguin Random House. Now I'm so excited to read this book because Marie Curie is an amazing physicist and chemist who helped us understand so much about the world. And her story also reminds us the importance of education and asking questions. You need to ask questions in order to discover new things, and we're going to learn how Marie Curie did that while reading this book.

Now I have two other things that I want to share. The first is that if you have questions, please feel free to ask those in the comments, just know I may not be able to get to them immediately and only if there's time. And also, if you need a partial transcript of this reading, that will be made available a little later today.

So let's go ahead and get started!

I am Marie Curie.

Reading from *I am Marie Curie* (approximately 4:20 – 20:06)

I am Marie Curie *includes copyrighted materials, and we do not have permission to include the written text of the book in this transcript.*

Conclusion (approximately 20:07 – 31:31)

The end.

Alright! I don't know about you, but I think Marie Curie and all of the work she did is amazing! She was able to study things that you can't see with the naked eye. So she was able to do all of these amazing things and teach us about atoms and radioactivity. And she also was able to do other things that were very helpful like those mobile X-ray units. And I found a picture I wanted to share with you of Marie Curie in one of those mobile X-ray units. How cool is that? Alright!

Now while we were reading the book, we talked about the periodic table of elements. So Marie Curie was learning about these elements when she was in school at that Flying University. And then she continued to do work about the periodic table. But before we get to the periodic table of elements, let's do a quick refresher of what I talked about before the reading, which was matter and atoms.

What's matter? Anything that has mass and takes up space. So things we're interacting with all the time. The air around us. It has mass. It takes up space. That’s matter. If you're sitting at a table, that has mass and takes up space. You even have mass and take up space. So you’re matter! So all of these things are matter, and matter is made up of atoms.

And, again, here's that illustration of an atom. It's very small. We can't see it. So we have to look at this illustration to better understand what it looks like. The atom has a center. That's the nucleus, and it contains protons and neutrons. Now protons, those are positively charged. So you can remember proton and positive. They both start with a P. And we're going to put that positive sign right next to the proton. Neutrons, they have no charge. So they're neutral. So you can think of neutral neutrons. Alright?

Now let's go back to that picture of the atom. So we know that the protons, those positively charged particles, and the neutrons are in the nucleus. But surrounding the nucleus, moving around, orbiting around the nucleus, are electrons. And electrons, those have a negative charge. Alright? So we're going to put this negative sign right next to the electron. Alright?

So matter is anything that has mass and takes up space. And matter is made up of tiny particles called atoms, which are made up of positively charged protons, neutrons with a neutral charge or no charge, and electrons with their negative charge.

Now what does this have to do with Marie Curie's work and the periodic table of elements? I'll tell you!

So the periodic table of elements, as we learned while reading the book, lists all of the elements that are known in the world. And it lists them in their most basic form. So when we look at a periodic table of elements, no matter what element we're looking at, whether it's hydrogen or carbon, nitrogen, whatever it is, we're looking at the most simple, basic form. So we're looking at one atom of that element. Alright?

Now yesterday, I talked about hydrogen, which is the first atom, or I'm sorry, the first element on this periodic table. But I want to look at a different element. Alright? So we're going to look at the sixth element on the periodic table of elements, which is carbon. Now I realize that this is a little hard to see, all of the information in that square. So let's zoom in.

Alright. This is what the square looks like for the sixth element on the periodic table of elements. So we have a big C in the center. What do you think that C stands for? It stands for carbon! Alright. So we know the C stands for carbon.

Let's look at this number above the C. What number is that? It's six! Now what do you think that this six means? We know that carbon is the sixth element on the periodic table of elements. Soo it tells us where we would find it on the table. But this number tells us some other stuff too. So this is the atomic number, and it tells us how many protons are in one atom of carbon. Alright?

Now the atomic number can also tell us how many electrons are in one atom of carbon because the number of protons is equal to the number of electrons. So how many protons in an element, or one atom of the element carbon? Six. And if we know that the number of protons is equal to the number of electrons, then how many electrons are in an atom of carbon? Six! It's the same. So there are six protons and six electrons.

Now when we talked about the atom, we know that it's got protons, electrons, and neutrons. So what about neutrons in an atom of carbon? This is where it gets a little tricky. It's not super easy to figure out the number of neutrons because it's not just directly written on the square. But we can use the numbers on the square to find the number of neutrons. So we're going to take this number at the very bottom, which is the atomic mass. And this tells us how much matter this atom has, so how much stuff makes it up. So the atomic mass of carbon is 12.011. To find the number of neutrons in an atom of carbon, we need to subtract the number of protons from the atomic mass. So let's do that math together!

I'm going to grab some paper and a pen. I'm going to write down the atomic mass of carbon, which is 12.011. And we know we need to subtract the number of protons from the atomic mass. Looking at our square of carbon on the periodic table, how many protons does carbon have? It has six. So we're going to subtract six from the atomic mass. 12.011 minus six, anyone know what that is? It's 6.011! And just to make that a little easier for us we are going to round down to six. So doing this math, we know that this atom of carbon has six protons, six electrons, and six neutrons. Alright?

Now yesterday, I mentioned that sometimes elements have different forms. And we started talking about that when we talked about hydrogen. So let's go back to that first element on the periodic table. Hydrogen in its most basic form has an atomic mass of 1.00784. But in some other forms of hydrogen, its atomic mass is greater. So these different forms have different atomic masses, but the protons are always the same. So in one form of hydrogen, it has one proton, one electron but an atomic mass of 2.014. So we know that we can find the number of neutrons by taking that atomic mass and subtracting the number of protons. So 2.014 minus one. What's that? It is 1.014, or one. So this different form of hydrogen has one neutron.

We call that an isotope, and sometimes isotopes are stable. That different form of hydrogen with its one neutron is a stable isotope. But sometimes elements that have these different forms, these isotopes, they are not stable. They're unstable. They're radioactive, so they're giving off energy.

Carbon has many different forms. And one form of carbon, one isotope of carbon, has an atomic mass of 14. Has the same number of protons, but it has an atomic mass of 14. So atomic mass of 14 minus six protons, which you would find in that form of carbon, what does that equal? It equals eight. So that form of carbon, that isotope of carbon, has eight neutrons.

And scientists can use that radioactive, unstable isotope in order to do different scientific work like trying to find out the age of certain materials. So we can use radioactivity for lots of different things. And we can thank Marie Curie for all of the research she did that lets us know that.

Now this is the end of Story Book Science. But before I go, I want to challenge you to look at a table of elements, that periodic table, and try to determine for the elements that Marie Curie discovered, radium and polonium, the number of protons, the number of electrons, and the number of neutrons. Alright? So that is my challenge to you.

Join me, well, join Prakriti next week. She's going to have an awesome STEM challenge that talks a little bit more about radiation and the different forms of it. And then join me next month for our next story book reading, which is *What Can a Citizen Do?* by Dave Eggers and illustrated by Shawn Harris being read with permission from Chronicle Books. So I hope to see you then! Bye!