

DIGITAL LESSON GUIDE

CURIOSITY – MARIE CURIE



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Curiosity means the desire to learn something. When used with integrity, curiosity is a positive force in the world. This lesson gives a real-life example of a woman who decided to honor her curiosity and ended up helping humanity. It helps girls understand the importance of pursuing curiosity and how to incorporate the character trait into their lives and relationships.



SECTION 1: PREPARATORY READING

I. INTRODUCTION FROM HEATHER STARK: WHY MARIE CURIE?

When I learned my first child was a girl, there was a nursery rhyme that played over and over in my head:

What are little girls made of?

What are little girls made of?

Sugar and spice and everything nice.

That's what little girls are made of.

When my daughter was born, I remember thinking about this poem and asking for the wisdom to help her grow into an independent, gracious woman who valued education and the world around her. But I always felt I was missing something. After a year or two, I started thinking perhaps it was more important for her to grow into a problem-solver. This was important to me. I wanted my daughter to fully understand she was the only thing that would stop her from reaching her goals—everything else was just a bump in the road. I felt a bit better about my wishes for her future, but still, I knew something was missing. It wasn't until I started researching the life of Dr. Marie Curie that I realized what that was.

Dr. Marie Curie was a cool woman—and I mean this in terms of calm, cool and collected. She figured out early what she wanted in life and then figured out how to do it. She wasn't full of overt emotions or drama; she simply did what needed to be done. Marie had two problems to be solved: how to break into the man-dominated world of science and how to break into the man-dominated world of education. Of course, these two problems led to a third one that she did not anticipate: how to overcome societal norms and expectations set for women in the late 1800s.

Women in the late 1870s were at a crossroads. Across Europe, there was a social movement among women. Literary salons were formed as a means for women to

socialize and share ideas and knowledge with each other and thus further their education. During this time, the main education of women consisted of learning how to sew, draw, play an instrument, speak another language and run a household. The basics of reading and math were taught, but because women did not work outside of the home and were generally regarded as less intellectual when compared to men, the need for extensive lessons in math and science was deemed unnecessary.

Then, along came Marie Curie.

I don't think adhering to social constraints or norms ever crossed Marie's mind. Nor do I think she saw them as huge obstacles to overcome. I truly think she saw these problems as bumps in the road. Marie had a solid foundation to rely upon when she decided to break societal norms. Here was a woman whose parents were both teachers. History does not provide details about how her mother became a teacher or what she taught, other than to note she was headmistress at a private boarding school for girls; however, Marie's dad was a math and physics teacher. Both of her parents encouraged her interest in science. Having two educated parents in Europe who supported a girl's right to learn and interest in science was a rare occurrence. This played a vital role in Marie's determination to find a way to make science her life.

Marie did not let social constraints keep her from learning. She was not overt about her desire to learn, but she wasn't quiet about it, either. She just was herself and set about finding a way to do the things that she, as a woman, was simply not allowed to do. Marie didn't bother with rumors, gossip or what others may have thought of her. In fact, her quote about people and ideas sums up her personality quite nicely: "Be less curious about people and more curious about ideas."

This quote is more about the drive for knowledge and understanding than it is about ignoring people. Invest in ideas instead of the pettiness of people. Invest in the curiosity of life rather than abiding by social norms and bowing to predetermined expectations.

Marie wasn't afraid to pursue an education when women were not allowed to go to college, earning advanced degrees in physics and math. She also wasn't afraid to focus her life's work on the pursuit of answers. She kept going and digging, and because of her determination, she found answers that many of us have benefited from—leading to radiation for cancer, the modern-day X-ray for broken bones, a change of mindset when it comes to women and their contributions to science. Marie and her curiosity were the key factors in these scientific and cultural breakthroughs.

In fact, Dr. Curie once said that women had questioned her about how she could justify being a scientist and a mother. Marie answered with a simple, "Well, it's not easy," and went on with her work. I would like to think that she knew she didn't have to explain herself to anyone, which endears her to me even more. It gives her spirit a bit of a spicy edge. Which leads to the next thing I want for my daughter: Once she's an adult, I pray that she learns the science of no explanation needed. She will not owe anyone

an explanation for her decisions. There is a bit of rawness to this way of thinking, but it is a mindset that gives our daughters the freedom to make their own decisions, solve problems for themselves and do what is best for them.

There is a self-reliance I see in Dr. Curie that our girls need to tap into and make their own. This quality made her the first woman in Europe to earn a Ph.D. and the first person to win Nobel prizes in chemistry and physics. Her studies on the radiation of all compounds led to today's medical breakthroughs that help kill cancer cells, and her research contributed to the development of the modern X-ray. Her problem-solving led to the solving of medical problems affecting millions of people worldwide. I wonder if Dr. Curie's mom prayed for her to be a problem-solver too. I also wonder if her prayers were anything like mine. I recite the nursery rhyme again:

What are little girls made of?

What are little girls made of?

Sugar and spice and everything nice.

That's what little girls are made of.

I missed the spice. Every girl needs spice.

So now my hopes center on my daughter growing into an independent, gracious, educated, problem-solving type of woman with a spicy-edged spirit—much like Dr. Marie Curie.

SECTION 1: PREPARATORY READING

II. THE JOURNEY OF MARIE CURIE'S LIFE

Dr. Marie Curie was the first of her kind: the first woman to earn a Ph.D. in France's history, the first woman recipient of a Nobel Prize (she received it twice), and the first woman faculty member at the University of Paris. Not to mention, she was a woman who was instrumental in helping soldiers during the First World War. Her accomplishments keep going, and all women should find her work a source of inspiration.

1867: Maria Skłodowska was born in Warsaw, Poland.

1882: At 15, Marie graduated high school with top honors and attended an underground "floating university," the only option for women in Poland.

1891: Marie and her sister Bronya left Poland and enrolled in a Parisian university that accepted women while alternately working and attending school.

1893: Marie discovered two elements: polonium (which she named after her native Poland) and radium.

1903: Marie received her Ph.D. and was invited to the Royal Institution in London. She and her husband received a Nobel Prize in Physics for their work with radiation. Marie was the first woman ever to win a Nobel Prize.

1911: Marie was awarded a second Nobel Prize for Chemistry.

1914: During World War I, Marie became the Director of the Red Cross Radiology Service and worked on mobile X-ray units called "petites Curies" or "little Curies."

1922: Marie narrowed her work to concentrate on the chemistry of radioactive substances.

1932: Marie died of aplastic anemia caused by the radiation she handled all her life.

Dr. Marie Curie's life appears linear in fashion. She knew what she wanted from a young age and then pursued it. Her laser focus and determination illustrate that women can and will do whatever it takes for them to accomplish their goals.

SECTION 1: PREPARATORY READING

III. CHARACTER TRAIT: CURIOSITY

Curiosity is a genderless quality, and like all character traits, it is born out of a human need or desire to understand our world. If girls are confident in who they are and what they want to achieve in life, they will be curious. It is a valuable character trait for all of tomorrow's leaders.

Most discoveries are made because of someone's curiosity. And some of history's most notable revelations have been introduced by women. A curious spirit is a good thing.

In 1886, Josephine Cochrane must have said to herself, "I can't stand washing the dishes; surely there must be a better way. If so, what is it, what does it look like, and how do I build it?" And thus, the first dishwasher was invented.

In the late 1800s, Margaret Knight decided that the common "round-bottomed paper bag" did not hold enough stuff, and somehow, there had to be a way to redesign this round bag so it could carry more. (She, too, must have valued packing as many items possible into one bag so she didn't have to make 20 trips unloading groceries from the carriage to the house.) Margaret eventually came up with the prototype for our current "flat-bottomed bags," thus making them more user-friendly. By the way, a man named Charles Annan tried to steal her idea from her and pass it off as his own. He claimed that a woman could not possibly be smart enough to design a flat-bottomed bag. Margaret proved this man wrong and received the patent for this design in 1871.

And lastly, Dr. Grace Hopper realized there must be a way to create a software program for computers that was easy to understand and that businesses could use. Thus followed the research that led her and her team to

develop Flow-Matic, the first computer language that used English-like commands rather than mathematical symbols. Ironically, in 1969, she became the first person ever to receive the Computer Science Man-of-the-Year Award. Yep.

Curiosity is something generally assigned to a valued piece of life's puzzle; hence, if one is curious about something, it must mean that particular nugget holds some degree of importance. Today's girls need to be curious because this leads to the understanding that life is not always lived on the surface. Everyone has roots that go down deep, and when we dig at these roots, we understand why people act differently from each other and believe in different things. When we learn these underlying meanings in people's lives, we suddenly see the value of accepting people just as they are. The harsh and critical judgment girls tend to sling at each other falls by the wayside and is replaced by acceptance, vulnerability and connection.

SECTION 1: PREPARATORY READING**IV. LESSON CONTENTS**

Below are descriptions of each item we offer as part of the Curiosity Theme. Depending on your purchase, some of these may not be applicable.

ILLUSTRATED PORTRAIT

Marie's portrait has her peering into a large test tube full of green liquid chemicals. One can almost see her curiosity at work, her brain formulating questions: Why is this liquid green? What can I do with it? What can it do for me? Can I break these chemicals down into smaller elements?

Her awards are casually positioned to the side over her textbooks—perhaps symbolizing that, although she has made some great discoveries in her field, she knows there still is work to be done. She keeps going, asking all the questions and finding all the answers. She obviously is not in pursuit of awards but in pursuit of scientific discoveries.

ACTIVITY BOOKLET

This condensed version of Marie's story, questions and/or activities pulled from the workbook will be useful for small groups with a limited amount of time. The questions will deepen the reader's understanding of Marie's life and why she was given the character trait of Curiosity.

BIOGRAPHY

From her childhood love of education to the curiosities that drove her to break laws in order to get a higher degree, we strove to give an honest retelling of Marie's story. One that shines a light on her legacy that young girls can understand and strive for.

BIOGRAPHY WORKBOOK

This is where the reader breaks down the lessons Marie's story teaches us and applies them to their life. The ques-

tions and/or activities will not only deepen the reader's understanding of who Marie Curie was and why she was given the character trait of Curiosity. But they ask girls to reflect on both Marie's and their own lives and find the space where they intersect. In the workbook, the girls will understand what is required in order to live a curious life.

TIMELINE POSTER

The timeline is an easy introduction to the life of each of our historical women. It is meant to be an overview of her accomplishments and impact on the world.

PLAY-IT-FORWARD CARDS

The Play-It-Forward Cards in the curiosity box highlight the courage it took for Marie to pursue higher education, which ties back to her quote on the key fob. The cards also encourage girls to share their discoveries, talents and, most importantly, ideas with others—much like Marie shared her discoveries of the elements radium and polonium and her theory about radioactivity with the world. It is through the sharing of ideas and curiosity that great success is achieved. When girls share ideas and encourage each other's curiosity, they realize there is room for everyone in the science lab.

KEY FOB

Marie Curie was a straight-up, no-frills type of woman, one who was steeped in academia, ambition and curiosity. The key to her success was her curiosity. She did not hesitate to ask questions and find answers, and because of this, Marie's accessory is a printed key fob with the quote, "You must never be fearful of what you are doing when it is right." This quote is so powerful and is key

in the pursuit of a life well lived. The thrill of cultivating questions and chasing the answers makes the accomplishment of the goal so powerful.

CHARM

Marie's charm bears the phrase, "There is beauty in science," engraved on a large disk with a beaker attached. The combination of the two creates a great proclamation that girls are venturing into STEM fields.

SECTION 2: GROUP ACTIVITY GUIDE**I. INSTRUCTIONS**

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Hand out the materials to the girls, allowing them to spend some time going through them independently. If you purchased the charm or accessory, invite them to try it on or talk about how they can use it or add the charm to a bracelet. Give them time to satisfy their curiosity so they can focus on the lesson once you begin. After a few minutes, bring their attention back to you and start the lesson.

The following sections provide you with guidance to get the girls thinking and discussing the topics related to the theme and lesson contents. Use the discussion questions to the extent time allows.

Consider using a whiteboard to note responses, comments and ideas from the group as you go along.

SECTION 2: GROUP ACTIVITY GUIDE

II. TIMELINE POSTER

STATEMENT OR INSTRUCTIONS:

Direct the girls to the timeline. Take turns having the girls read each event on the poster.

QUESTIONS:

- What do you like about science?
- After reading the timeline, what do you think is Dr. Marie Curie's greatest accomplishment?

GRACE & GIGI

THE JOURNEY
of
MARIE CURIE

1867
MARIE SKŁODOWSKA
WAS BORN IN WARSAW,
POLAND.

EIGHTEEN EIGHTY-TWO
At 15, Marie graduated high school with top honors and attended an underground "boarding university," the only option for girls in Poland.

EIGHTEEN NINETY-EIGHT
Marie discovered two elements: polonium (which she named after her native Poland) and radium.

1891
MARIE AND HER SISTER BRONIA LEFT POLAND AND ENROLLED IN A PARISIAN UNIVERSITY THAT ACCEPTED WOMEN WHILE ALTERNATELY WORKING AND ATTENDING SCHOOL.

1903
MARIE RECEIVED HER PH.D. AND WAS AWARDED TO THE ROYAL INSTITUTION IN LONDON SHE AND HER HUSBAND RECEIVED A NOBEL PRIZE IN PHYSICS FOR THEIR WORK WITH RADIATION. MARIE WAS THE FIRST WOMAN EVER TO WIN A NOBEL PRIZE.

NINETEEN ELEVEN
Marie was awarded a second Nobel Prize for Chemistry.

1914
During World War I, Marie became the Director of the Red Cross Radiology Service and worked on mobile X-ray units called "petites Curies" or "little Curies."

1922
MARIE NARROWED HER WORK TO CONCENTRATE ON THE CHEMISTRY OF RADIOACTIVE SUBSTANCES.

1932
MARIE DIED OF APLASTIC ANEMIA CAUSED BY THE RADIATION SHE HANDLED ALL HER LIFE.

SECTION 2: GROUP ACTIVITY GUIDE

III. ILLUSTRATED PORTRAIT

STATEMENT OR INSTRUCTIONS:

Direct the girls to the portrait.

QUESTIONS:

- Have you ever heard of Dr. Marie Curie? If so, what do you already know about her?
- Why do you think there is a green light in her portrait? (To represent the chemicals she discovered.)
- What else do you notice in the portrait?



SECTION 2: GROUP ACTIVITY GUIDE

IV. BIOGRAPHY

STATEMENT OR INSTRUCTIONS:

NOTE: If time is limited, group leaders may consider assigning the reading to be done independently before the group meets.

If the group is reading the biography together, consider doing so during silent reading time, out loud by the facilitator, or by taking turns, each girl reading a paragraph or page.

GUIDED QUESTIONS TO DEEPEN UNDERSTANDING OF THE BIOGRAPHY:

- Could you imagine having to sneak to get into school? How do you think Marie felt about education if she was willing to attend a floating university?
- What do you think about the fact that Marie won a Nobel Prize but decided not to go to the ceremony so she could stay home and work?
- Do you think Marie ever felt proud of herself?
- How do you think it feels to be the only woman with a doctoral degree? The only woman in Europe to have a Dr. in front of her name?



SECTION 2: GROUP ACTIVITY GUIDE

V. ACTIVITY BOOKLET READING SECTION

STATEMENT OR INSTRUCTIONS:

ASK THE GIRLS:

What do you think the quote on the cover of the booklet means?

Have the girls open up the activity booklets and invite them each to take turns reading a paragraph.

OPTIONS:

1. Read parts of the booklet and use the suggested questions below to deepen the discussion and check for understanding.
2. Read the booklets (up to the activity questions) and then use the suggested questions below to deepen the discussion and check for understanding.

GUIDED QUESTIONS TO DEEPEN UNDERSTANDING OF THE ACTIVITY BOOKLET READING:

- Could you imagine having to sneak into school? How do you think Marie felt about education if she was willing to attend a floating university?
- What do you think about the fact that Marie won a Nobel Prize but decided not to go to the ceremony so she could stay home and work?
- Do you think Marie ever felt proud of herself?
- How do you think it feels to be the only woman with a doctoral degree? The only woman in Europe to have a Dr. in front of her name?
- Turn to the middle of the booklet and look at the quote: "Humanity also needs dreamers." What do you think Marie meant when she said this?



SECTION 2: GROUP ACTIVITY GUIDE

VI. ACTIVITY BOOKLET QUESTION SECTION OR BIOGRAPHY WORKBOOK

STATEMENT OR INSTRUCTIONS:

Invite the girls to complete the activities in the back of the booklet and discuss their answers. This is the heart of the lesson. While some girls may not want to share their answers, please allow time for discussion and processing their answers. The objective is for the girls (when applicable) to apply lessons about the woman's life and character trait to their own lives.

The following are the questions found in the Activity Booklet or Biography Workbook. They are meant to be answered independently by the girls in the booklet, but may be referenced as needed in the lesson.

ACTIVITY 1:

- Marie Curie was fueled to overcome obstacles because she was so curious about science.
- Curiosity leads to passionate pursuits.
- What are you curious about?
- If you could investigate anything, what would it be?
- What about it makes you curious?

ACTIVITY 2:

- Marie Curie had to go to classes in secret because girls weren't allowed to attend college in Poland.
- Faulty beliefs about a person's skills and abilities can feel hurtful.
- Have you ever been told you can't do something because you are a girl?
- What was your reaction? How did you feel? What did you do in response to that statement?

ACTIVITY 3:

- Marie Curie was brave to ask questions. In doing so, she made significant discoveries in the field of science.
- Pursuing the right questions can lead to amazing discoveries.
- Have you ever been embarrassed to ask questions? Why or why not?
- What are the benefits of asking questions?
- How does confidence help you ask them?

ACTIVITY 4:

- It took Marie Curie years of pursuing her curiosity in order to make discoveries.
- Spend the week investigating the topic you chose in Activity 1.
- Write your discoveries below.



ACTIVITY 5:

- Marie and her sister supported each other in their dreams. Together, they helped one another achieve their goals.
- Having a system of support is important when you are pursuing a passion.
- Who supports your dreams? How do they show their support for you?
- Whose dreams do you support? How do you support them?

ACTIVITY 6:

- Marie and Pierre worked together and learned from each other's observations and discoveries. They knew together they could learn more than by working on their own.
- Invite a trusted adult woman to read Marie's story and interview her about what she learned from it.
- What did she learn from Marie's story?
- What did she think of Marie's curiosity?
- What is she curious about?

QUESTIONS TO DEEPEN DISCUSSION**[IF TIME ALLOWS]:**

- In your own words, describe what it means to be curious.
- Who do you know that is a curious person?
- Describe the difference between being curious and being nosy.
- How does curiosity make the world a better place?

SECTION 2: GROUP ACTIVITY GUIDE

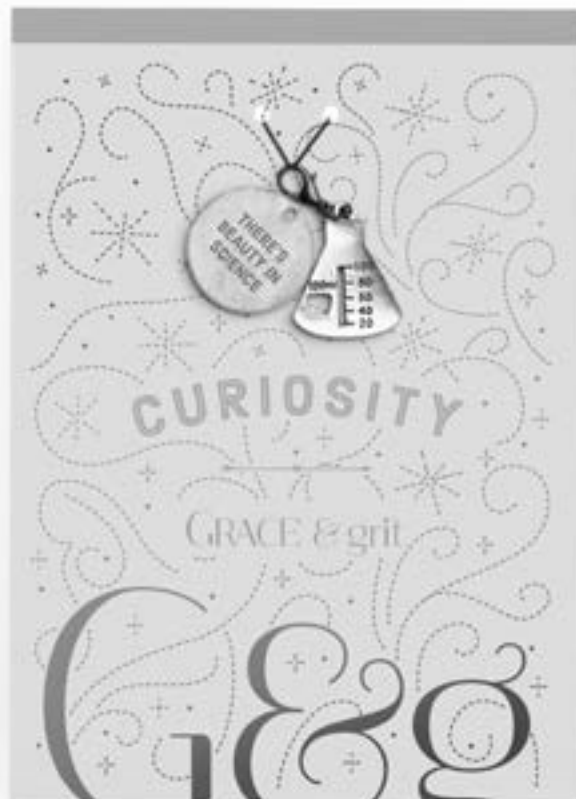
VII. CONTENT DISCOVERY

STATEMENT OR INSTRUCTIONS:

Have the girls take the key fob and the G&G Charm from the box. Use each item as you discuss the following questions.

QUESTIONS:

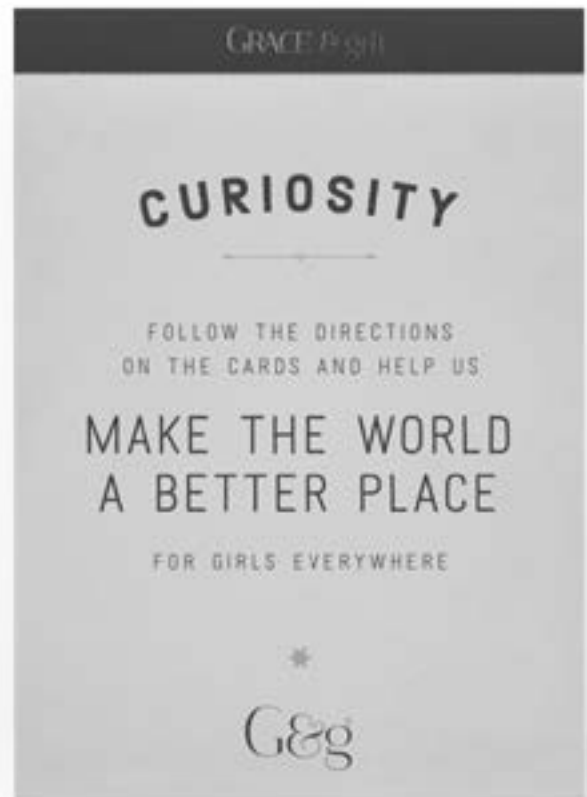
- What do you notice on the key fob?
- Finish this sentence: The key to Marie's success was her_____.
- Read the quote on the charm. Do you agree or disagree?



SECTION 2: GROUP ACTIVITY GUIDE

VIII. PLAY-IT-FORWARD CARDS**STATEMENT OR INSTRUCTIONS:**

Tell the girls what the Play-It-Forward Cards are and how they are intended to be used with other girls in their daily lives. Have the girls take the Play-It-Forward Cards from the box and browse through them for a moment. Go around the group and have them read the front and back of one card aloud. Ask the girls what that card means to them and how they could use it in everyday life. (Depending on time, you may want to limit this exercise to 3 cards.) Remind them that, over time, as they choose to pass out a card to another girl with positive intent, their name will go into a drawing to get the tote bag.



SECTION 3

CLOSING DISCUSSION GUIDE

As you close the lesson, you are looking to spark a conversation among the girls about how they plan to use Harriet's inspiration to improve their lives while also helping and supporting one another. The goal is to help them recognize how topics from the lesson apply to their own lives in a positive way.

DISCUSSION QUESTIONS

Optional: Use the Timeline Poster as a focal point for open discussion.

- What impresses you most about Marie?
- What did you find most interesting?
- What are some ways in which you can practice curiosity in your life?
- How can you help someone else practice curiosity?
- What ideas do you have for using the Play-It-Forward Cards?
- How did this lesson help you?