In the Shadows of Edison: THE NIKOLA TESLA STORY

Study Guide

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Touring September 16 – November 15, 2013
Grades 3-12
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A Brief Synopsis

A brilliant young man. An immigrant scientist. A misunderstood genius. An ignored inventor. Whatever your feelings about the man himself, the story of Nikola Tesla is funny, educational, and “electrifying.” ArtReach’s world-premiere 4-person touring production, written and directed by Chris Stewart, spans the decades from Tesla’s childhood in Senj, Serbia, through his immigration to New York City, to his ultimate triumph: the world’s first hydroelectric plant at Niagara Falls.

Travel back in time to the late 1800s and enter the dazzling mind of a brilliant young engineer who, as a boy, impresses his family and village with his wit and scientific prowess. To create his inventions, Tesla relies on his strong math and science skills, a photographic memory, and a mysterious blinding light containing flashes of inspiration. He travels Europe, gaining knowledge, and realizes his ideas can only take root in one place—the United States.

When he immigrates to New York City, Tesla works for Thomas Edison, the greatest inventor in the world. He tries to pioneer Alternating Current, which would produce more energy, more safely, than Edison’s machines. But in the face of ridicule and prejudice, Tesla quits, choosing instead to pursue Alternating Current on his own. The rivalry, known as The War of the Currents, between Edison and Tesla spirals out of control—with unexpected consequences. Through famous friendships and a dedication to “free power,” Tesla seeks redemption in the ideals and wonder of his youth.

Learn the true story of this often ignored inventor, whose work as a “mad scientist” eventually led to the Tesla coil, X-ray, RADAR, transistors, wireless energy, and artificial lightning.
### MACHINE NATION (3rd-5th grade)

*In the Shadows of Edison: The Nikola Tesla Story* reveals that many of the machines we still use today—the telephone, the light bulb, the movie or motion picture—were created in roughly the same time period, late 1800s-early 1900s. But what if these machines had not been created?

**Materials Needed:**
- Paper/Pencil

1) Think about a typical day in your life. Make a list of all the machines you come into contact with in a single 24-hour period. Compare your list with a classmate’s. Did he/she list some machines you forgot? Add them to your list.

2) With your partner, choose one machine on your lists that you could realistically do without for one whole day. Hypothesize how your day would go differently.

3) Make a plan to do just that: Choose a day and start time this week, and alert family and friends of your plan. (Update your social media, if you like!)

4) When the day comes, go without the machine you’ve chosen. Keep notes as you observe how your life is different for that day. Is it easy or difficult? Why?

5) After the 24-hour period is complete, compare notes with your partner. Were your hypotheses true? What unexpected changes were there? Present your findings to the class.

**STANDARDS MET**
- Technology, Scientific method, Tools, Materials, Skills, Inventors/Inventions, Writing, Critical thinking, Comparison and energy power, History

### THE POWER IN YOU (6th-8th grade)

Most of *In the Shadows of Edison: The Nikola Tesla Story* takes place during the Age of Invention, or the Gilded Age, roughly 1870-1910. Many inventors were hard at work around the globe, sometimes on the same ideas. Thomas Edison and Nikola Tesla, for example, were both working on finding ways to use electricity. But what do we know about these inventors?

**Materials Needed:**
- Paper/Pencil
- Access to research materials (Books, Internet, etc.)

1) Using a web browser, go to: [http://www.shmoop.com/great-inventions/timeline.html](http://www.shmoop.com/great-inventions/timeline.html). Choose an invention (the telephone, the motion picture, the radio) that we still use today. What is the inventor’s name?

2) Using your library and/or trusted Internet sources, research the inventor. Find at least 10 key facts about his/her life, including details of their childhood.

3) Make a Venn Diagram of your life and your inventor’s. In each circle, list the differences between yourself and him/her, but where the circles overlap, put the things you have in common.

4) Based on your similarities/differences, would you have preferred to live in their time period or your own? Why? Discuss with the class.

**STANDARDS MET**
- Technology, Scientific method, Tools, Materials, Skills, Inventors/Inventions, Writing, Critical thinking, Comparison of cultures over time

### THE CASE OF EDISON v. TESLA (9th-12th grade)

This play focuses on two inventors, Thomas Edison and Nikola Tesla, and asks the audience whether they believe “his story, or history.” We see Edison use rhetoric and scare tactics to convince the public that Tesla’s inventions are dangerous and evil. As we study the past, it is sometimes hard to distinguish between truth and rumor. In today’s age of social media and information overload, do you think it is easier or more difficult to tell the difference between fact and fiction? What sources should we trust? Can you think of any examples of exaggeration, scare tactics, etc., being used to sway public opinion?

**Materials Needed:**
- Paper/Pencil

1) Imagine that the Edison-Tesla rivalry took place today. What methods of persuasion would Edison and Tesla have used? Consider social media, Internet news sources, cyber-bullying, etc. How would each man attempt to sway public opinion?

2) Choose one side of the debate. Do you agree with Edison or Tesla? Write a short persuasive essay supporting your point of view. Use a combination of facts and opinion, and present your essays to the class.

**STANDARDS MET**
- History, Literature, English, Creative writing, Public speaking, Local history, Geography, Social studies skills and methods, Research, Communication
In the Shadows of Edison: The Nikola Tesla Story presents two inventors, Thomas Edison and Nikola Tesla, who had very different approaches to creating new machines. Tesla, for example, could visualize his inventions in 3-D and build the machine once, while Edison was famous for saying, “I haven’t failed. I’ve only found a thousand ways it won’t work.” (Edison also said, “Genius is 1% inspiration and 99% perspiration.”) In other words, Edison’s approach was trial-and-error, while Tesla’s was based on a detailed imaginary blueprint.

Imagine an invention you would like to create. What functions would it have? What task would it perform? Draw a design or blueprint below, on the “drawing board.”

**BONUS:** On the back of this page, draw an advertisement for your invention! This can be in the form of magazine, newspaper, Internet, or billboard ads.
MAKERS MAKING MONEY

In the Gilded Age (1870-1910), many inventors earned their living by getting patents, or exclusive rights, once their inventions were finished. Depending on the arrangement with a country’s patent office, inventors could be paid every time their invention was sold, used, or copied by a competitor.

In the case of inventor Nikola Tesla, he was paid $2.50 for every horsepower of electricity produced from his generators. Tesla sold his patents to George Weshinghouse, a millionaire, for $60,000.

Read and solve the word problems below. Use your basic math skills to find the solutions, and be sure to check your work.

BONUS: On the back, create your own word problem about the Gilded Age.

1.) Tesla creates a water turbine that, when new, creates 300 horsepower of electricity per month. But after 12 months of continued use, the turbine only produces 200 horsepower/month, and after 24 months it only produces 150 horsepower/month for an additional 6 months before it needs to be replaced. Remember that Tesla was paid $2.50 per horsepower. If the turbine runs continually for 30 months, how much total horsepower is produced? How much total money does Tesla make from this one turbine?

2.) Filament light bulbs come to replace gas lamps in the late nineteenth century. In 1880, Thomas Edison creates a bulb that burns for 1,200 hours and costs $1.00. If Edison earns $.35 for every bulb purchased, how much total money does he make if a customer needs 3,600 hours’ worth of electricity? BONUS: Adjusting for inflation, today these bulbs would cost about $23.00 apiece. How much would Edison make per light bulb sold today?

Standards Met: Math (Patterns, Functions, Algebra, Data analysis, Ratios, Measurements, Fractions)
THE BULLY INVENTOR

Have you ever been bullied? Have you ever seen bullying taking place and weren’t sure what to do about it? Have you ever been the bully?

Thomas Edison, one of the characters in The Nikola Tesla Story, is a grown-up bully. Through business practices, prejudiced remarks, and scare tactics, Edison smears Tesla’s name.

This worksheet is an opportunity for you to write about bullying from your point of view. We encourage you to talk with your teachers, parents and counselors, to discuss ways of stopping bullying in your school. What you write on this page could be the start.

What is bullying? Use your own words and observations.

______________________________________________________________________________________________________________________________

______________________________________________________________________________________________________________________________

______________________________________________________________________________________________________________________________

Describe a time when you witnessed someone being bullied.

______________________________________________________________________________________________________________________________

______________________________________________________________________________________________________________________________

______________________________________________________________________________________________________________________________

What are three kinds of bullying that you see happening at your school?

______________________________________________________________________________________________________________________________

______________________________________________________________________________________________________________________________

______________________________________________________________________________________________________________________________

Watch ArtReach’s production of In the Shadows of Edison: The Nikola Tesla Story. Is Thomas Edison, in fact, a bully? Why or why not?

______________________________________________________________________________________________________________________________

______________________________________________________________________________________________________________________________

Standards Met: English, Writing, Critical thinking, Social studies, Creative reflectionexpression
MAKERS MAKING MONEY

1.) $12(300) + 12(200) + 6(150) = 3,600 + 2,400 + 900 = 6,900$ horsepower total; $(\$2.50)(6,900) = \$17,250.00$ total

2.) At 1,200 hrs/bulb, 3,600 hrs = 3 bulbs. $3(\$0.35) = \$1.05$ total
   BONUS: At $.35 earned per dollar, $23.00(0.35) = \$8.05$ per bulb today
STUDY GUIDE SURVEY

We value your input! Please take a moment to let us know how we are doing.

School __________________________ Grade levels of your students ___________ Show title _______________

How much of this study guide did you use? All A lot Half Only a little

Please circle the appropriate response:

6 = strongly agree; 5 = agree; 4 = somewhat agree; 3 = somewhat disagree; 2 = disagree; 1 = strongly disagree; N/A = does not apply

For me, this study guide enhanced the play

6 5 4 3 2 1 N/A

The lessons offered fit my curriculum

6 5 4 3 2 1 N/A

Overall, I found this study guide useful

6 5 4 3 2 1 N/A

Did you get the study guide from The Children’s Theatre of Cincinnati’s website? Y N

Was there a specific lesson/activity that you really liked or did not like? Why?

What would you like to see offered in future study guides?

We appreciate any further comments. Please use the back if necessary.

Your name (optional) ____________________________ Position/Title ____________________________

Email (optional) ____________________________

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