

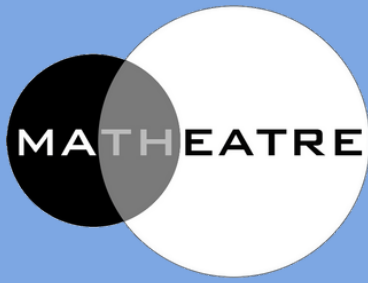
# Activity and discussion guide



## Ada Lovelace

History Science Theatre ON DEMAND  
A production of Matheatre

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# Ada Lovelace



Dear Teacher,

Thank you for bringing Matheatre's *History Science Theatre ON DEMAND* into your classroom or home learning curriculum. Matheatre's mission is to use live theatre to tell stories that inspire excitement about math and science. We hope that the personal storytelling and character interpretations in this video series will make the many faces of science relatable and alive for modern students.

In this guide you will find:

- A brief biography of the historical figure
- A summary of key concepts presented in the video story
- Suggested discussion questions
- Suggested activities
- Suggested reading

We believe that *stories* hold immense power to engage the imagination, foster empathy, encourage creative and critical thinking, and educate by way of entertainment. We hope the stories in this series inspire lively conversation, exploration, experimentation, curiosity, and perspective for each of your students as they make history in their own way.

Sadie Bowman  
Co-founder, Managing Director  
Matheatre

# Who was Ada Lovelace?

**ADA AUGUSTA BYRON KING, COUNTESS OF LOVELACE** (1815-1852) is credited as the creator of the world's first computer algorithm, in 1842. The daughter of famed poet Lord Byron, Ada grew up in a life of wealth and privilege which allowed her to pursue her love of mathematics, despite the limitations imposed by prevalent gender roles of the time. She collaborated with Charles Babbage, a prominent mathematician of the day, on designs for the Analytical Engine, a steam-powered machine that could do math.

Ada's most enduring contribution to this project was her future-forward vision that such a machine could be taught to read numeric algorithms and conduct tasks more abstract and complex than mere calculations. Although the Analytical Engine was not completed during Ada's lifetime, her work paved the way for the emergence of computer coding as we know it today.

## Key lesson concepts:



Numbers and numerals: symbols to represent quantity



Algorithms: instructions



The role of imagination in mathematics



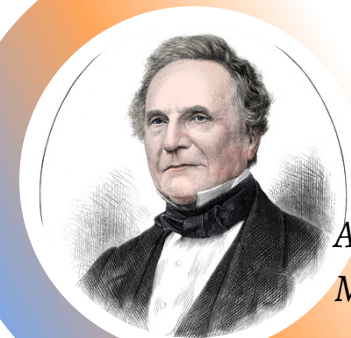
Anyone can be a mathematician!

*Ada as a child*



## Suggested discussion questions

- Ada's mother thought math does not use imagination, but Ada thinks math is very imaginative. What do you think? Is math creative or not creative?
- Ada once tried to build a mechanical horse that could fly, using math to understand things like weight, balance, distance, etc. What is a not-yet-invented machine that you'd like to invent, and how would you use math to make it work?
- Some of Ada's experiments didn't succeed the way she wanted them to, but she learned what she could from her failures and kept trying. Have you ever done an experiment that didn't go the way you expected, and what did you learn?



*Ada's eccentric friend  
Mr. Babbage*

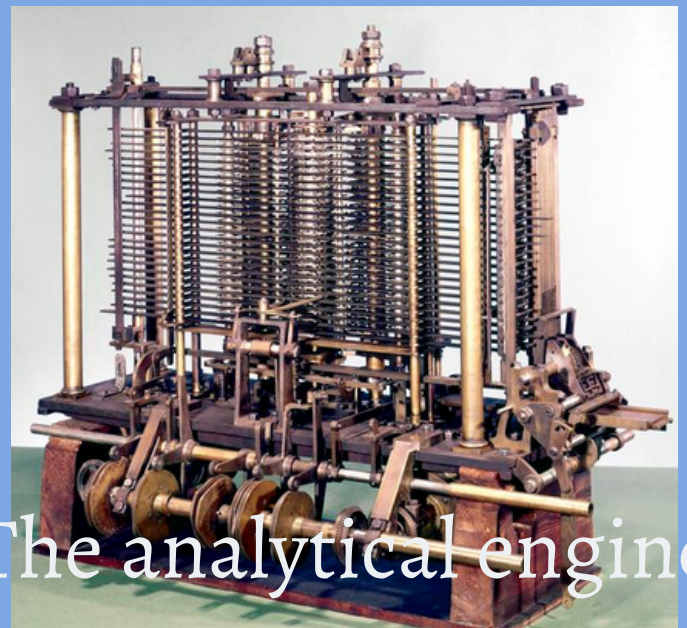
## Suggested activities

Ada says she was born in the year 1815—quite a long time ago! How would you use math to find out how old Ada would be today? (Her birthday is December 10, so if you'd like, write her a note to let her know how old she will turn on her next birthday!)



**Ada loves poetry! She challenges you to write a poem that rhymes words with numbers or numeric phrases. An example:**

**Roses are red, violets are blue  
One plus one equals two  
Two plus one equals three  
Oh how happy math makes me!**



The analytical engine

## Suggested discussion questions

- Ada talks about having advantages because of her social status and wealth, and disadvantages because of gender roles during her lifetime. Do you think it's fair to assume someone is good at math or not good at math because of their gender, the color of their skin, their nation of origin, or their wealth?
- Ada collaborated with her friend Mr. Babbage to design the Analytical Engine. Have you ever *collaborated* with a friend on a project that really excites you?
- Ada's idea to use numeric algorithms to teach the Analytical Engine to do complex tasks was a major step toward the invention of the computer. What about your life today would be different if computers had not been invented?



Ada's father, the poet  
Lord Byron

## Suggested activities

Ada used a numeric algorithm to create gestures with your hands. Using the same algorithm, choose a letter (or more!) from the American Sign Language alphabet (pictured below) and program a friend or family member to create it! You'll have to teach them the code and the commands if they don't know them already!

Thumb=1

Index finger=2

Middle finger=3

Ring finger=4

Pinky=5

Possible commands:

Extend

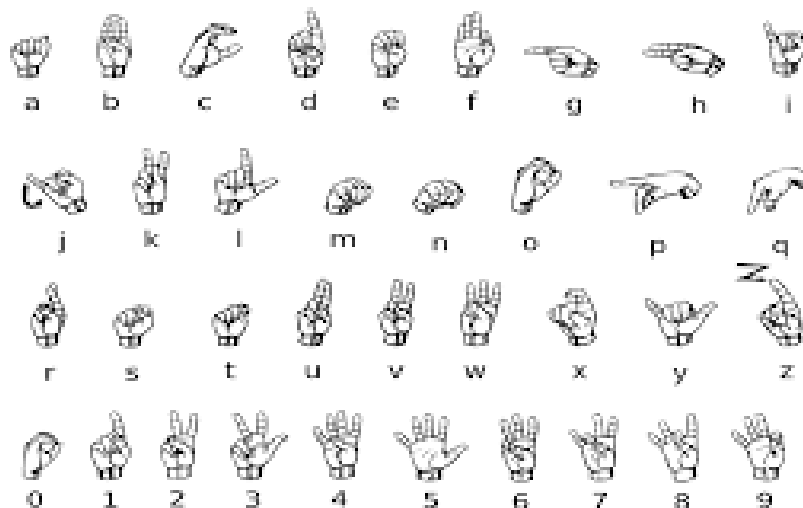
Stay in place

Rotate left

Rotate right

(create your own commands as needed!)

### American Sign Language Alphabet





1	2
3	7

36	9
27	58

525	606
282	773

## *Suggested activities*

Ada thinks imagination is a very important part of math. Here's a game she loves to play! She has made three different sets of four numbers (written for you on the left). Each set of four numbers has three numbers that follow a pattern and one number that doesn't belong. How many different patterns can you identify? Each set has more than one answer, and as long as you can explain your pattern and its exceptions, you'll never be wrong!



*A daguerrotype photo of the real Ada, probably taken in 1843.*

## Suggested reading

*Ada's Ideas: The Story of  
Ada Lovelace, The World's  
First Computer Programmer*



BY FIONA  
ROBINSON

*Dreaming in Code:  
Ada Byron  
Lovelace,  
Computer Pioneer*



BY EMILY  
ARNOLD  
MCCULLY

*Women in Science: 50  
Fearless Pioneers Who  
Changed The World*



BY RACHEL  
IGNOTOFSKY

*Sasha Savvy  
Loves to Code*



BY SASHA  
ARIEL ALSTON



## Modern day Ada Lovelaces!

If you speak the language of math, the whole universe is open to you! Astronomers, biologists, chemists, engineers and other scientists ALL use math every day! Can you think of other exciting professions that use math?

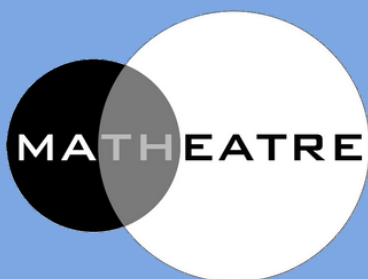
We don't know what Ada Lovelace would be up to if she were around today, but many people are expanding on her work and taking her ideas in new directions.

Computer coders like Dana, pictured here, write and test code using algorithms! Dana says she loves coding because *"it can make a positive difference! There are so many ways that computers and technology can improve our lives, and coders build the tools that make those changes happen. Right now, I'm working on a project that helps communities respond to natural disasters. It's exciting to know that my code is keeping people safe!"*

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