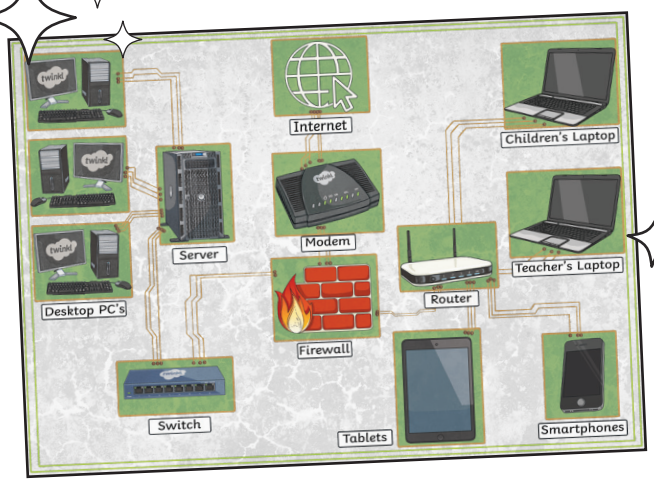
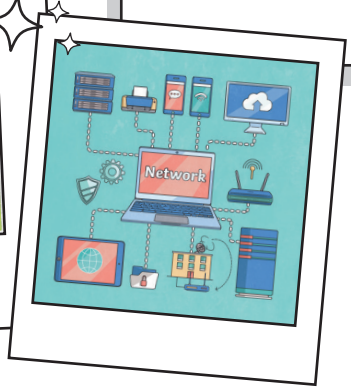
Ada Lovelace

Ada Lovelace is thought of by many as the first computer programmer and for writing the first **computer program**. She was a Victorian mathematician and writer and the daughter of Lord Byron, the famous British poet.

Early Life

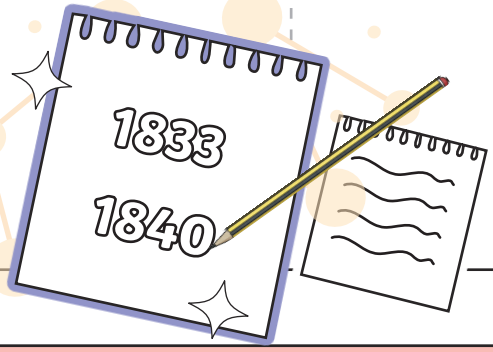
Augusta Ada Byron was born on the 10th December 1815. Her mother was a mathematician called Lady Anne Isabella Milbanke. She wanted her daughter to have a scientific education so Ada studied mathematics, science and logic. Ada enjoyed her studies and used her knowledge to dream up her own inventions. By the time she was 12, she had created her own design for a steam-powered flying machine.





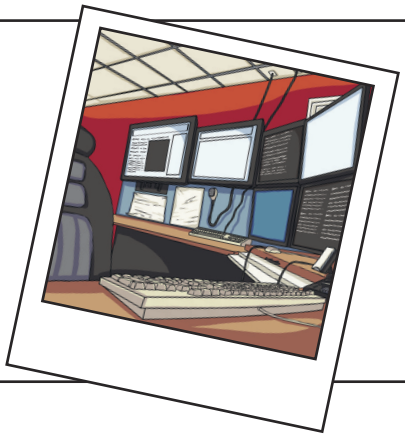
Teenage Years

At a party in 1833, she was introduced to a fellow British mathematician called Charles Babbage. He enjoyed seventeen-year-old Ada's knowledge and interest in mathematics and science and the two soon became lifelong friends.
At Babbage's suggestion, she began studying advanced mathematics with University of London professor, Augustus de Morgan in 1840.



Did You Know...?

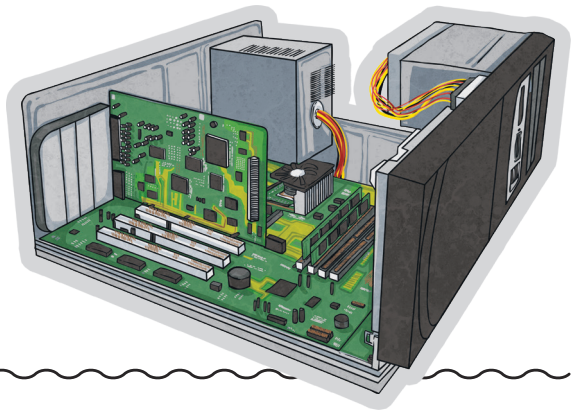
Alan Turing (considered by many to be a founding father of modern computer science) read Ada's written work during the Second World War and used it to write about his own computing ideas.



Interesting Engines

During the first couple of years of their friendship, Ada and Charles often talked about the plans for his invention called the Difference Engine. It was supposed to be an **automatic** and mechanical calculator that could solve a variety of mathematical problems.

In the 1830s, Babbage went on to design a new, more advanced machine he called the Analytical Engine. Today, modern experts refer to it as the first automatic digital computer. Like a modern computer, it was designed to store information to use later, solve more complex mathematical **calculations** and follow instructions given to it to complete a task.



Ada's Notes

Luigi Menabrea, an Italian engineer, saw Babbage speak publicly about his Analytical Engine and wrote an article in French about it in 1842. Not long after, Charles asked Ada to translate Menabrea's text from French to English. Finishing her version in 1843, Ada tripled the size of the original article because she not only translated it but added notes and ideas of her own. In her version, Ada proposed and explained all of the possible actions the engine could perform in addition to calculating numbers. Ada also included complete instructions that could be given to the engine to perform a specific calculation. These instructions are considered by many to be the first ever computer program.

Personal Life

Ada married the 8th Baron of Ockham, William King-Noel, when she was 19 years old in 1835. Three years later in 1838, he became the first Earl of Lovelace and Ada became Countess of Lovelace. Together, they had three children.

Today, Ada is acknowledged by many in the computer science field as someone who imagined the possibilities of computing over one hundred years before its time.

Glossary

automatic: Something that is able to work by itself.

calculations: The answers to maths problems solved by addition, subtraction, multiplication or division.

computer program: A set of instructions or guidelines for a computer to follow.

Questions

1. Who was Ada's father? Tick one.

   - ○ Alan Turing
   - ○ Lord Byron
   - ○ William King-Noel
   - ○ Charles Babbage

2. Number the events from 1-4 to show the order that they happened in.

   - ☐ Ada married the 8th Baron of Ockham.
   - ☐ Ada Lovelace was born.
   - ☐ Ada began studying advanced mathematics with Augustus de Morgan.
   - ☐ Ada translated and added onto an article about the Analytical Engine.

3. When did Alan Turing read Ada's translation?

   _____

4. Look at the last paragraph.

   Find and copy one word that means the same as 'recognised'.

   _____

5. Fill in the missing words.

   It was _____ to be an automatic and mechanical calculator that could solve a _____ of mathematical problems.

6. What surprised you the most about Ada Lovelace? Explain your answer.

   _____

   _____

   _____

7. Do you think Charles Babbage respected Ada's opinion? Explain your answer.

8. If you could ask Ada one question, what would it be and why?

Answers

1. Who was Ada's father? Tick one.

   ○ Alan Turing
   ✓ **Lord Byron**
   ○ William King-Noel
   ○ Charles Babbage

2. Number the events from 1-4 to show the order that they happened in.

   2 Ada married the 8th Baron of Ockham.
   1 Ada Lovelace was born.
   3 Ada began studying advanced mathematics with Augustus de Morgan.
   4 Ada translated and added onto an article about the Analytical Engine.

3. When did Alan Turing read Ada's translation?

   Alan Turing read Ada's work during the Second World War.

4. Look at the last paragraph.

   Find and copy one word that means the same as 'recognised'.

   acknowledged

5. Fill in the missing words.

   It was **supposed** to be an automatic and mechanical calculator that could solve a **variety** of mathematical problems.

6. What surprised you the most about Ada Lovelace? Explain your answer.

   Pupils' own responses, such as: I think what surprised me the most was how she was able to learn mathematics despite being a woman in Victorian times. It was unusual for that time period.

7. Do you think Charles Babbage respected Ada's opinion? Explain your answer.

   Pupils' own responses, such as: Yes, I think he did respect her because they wrote to each other about mathematics and visited each other often. He also asked her to translate Menabrea's article, which means he trusted her judgement.

8. If you could ask Ada one question, what would it be and why?

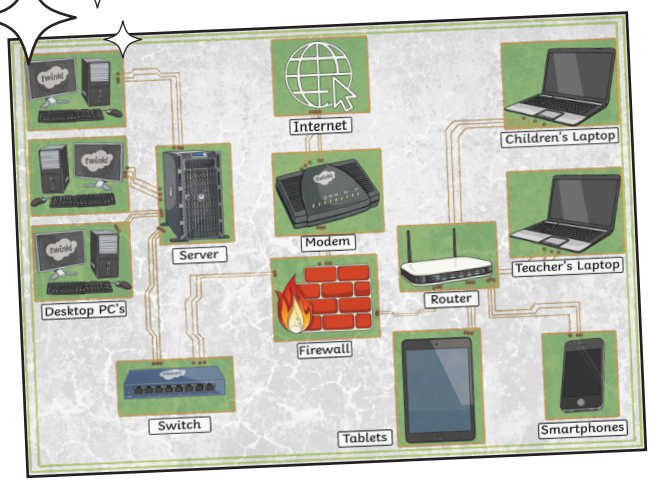
   Pupils' own responses, such as: I would like to show her a modern computer and ask her what she thought of it. I think it would be amazing to see her face and watch her work on it. I would love to know her thoughts on it.

Ada Lovelace

Ada Lovelace is considered by many to be the first computer programmer because she wrote a set of instructions that is often referred to as the first computer program. She was a Victorian mathematician and writer.

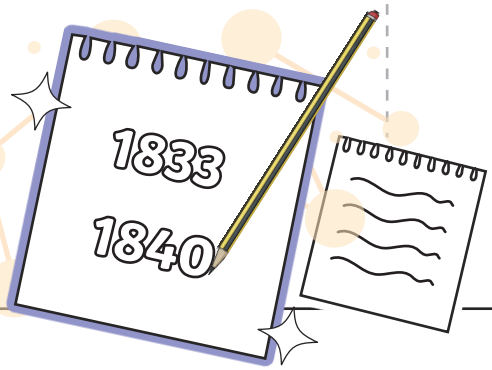
Early Life

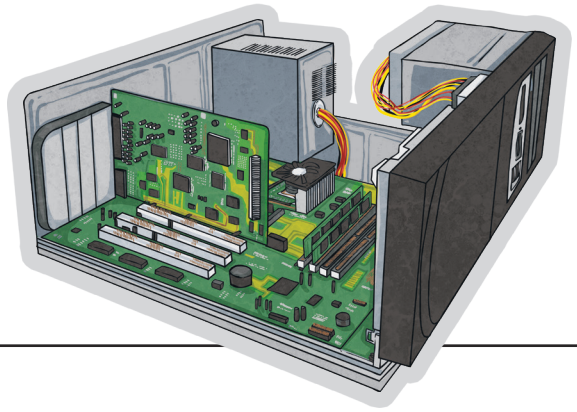
The only child of Lord Byron and his wife, Lady Anne Isabella Milbanke, Augusta Ada Byron was born on the 10th December 1815. Her mother wanted Ada's education to be science-based so Ada studied mathematics, science and logic with private tutors. Ada seemed to enjoy it and had a talent for mathematics. She was so intelligent that she was able to study ideas from the latest Victorian inventions and draw up her own designs. When she was 12, she designed her own steam-powered flying machine.



Teenage Years

As a child, Ada often suffered from headaches and ended up staying in bed for a whole year in 1829 due to the measles. However, her illnesses didn't stop her from learning. In 1833, Ada met Charles Babbage, a fellow British mathematician, at a party. He was pleasantly surprised with seventeen-year-old Ada's in-depth understanding of mathematics. After that, the two became good friends and spent many years writing and visiting each other. Babbage even helped her become an advanced mathematics pupil of University of London professor, Augustus de Morgan in 1840.





Interesting Engines

One of Babbage and Ada's frequent topics of conversation was a machine he had designed called the Difference Engine. It was meant to be an automatic and mechanical calculator that could calculate and solve a variety of mathematical problems. Ada was very interested in the Difference Engine. She wrote to and visited Babbage often to discuss the mathematical possibilities and mechanics of his machine. Babbage fondly nicknamed Ada 'The Enchantress of Numbers.'

Dreaming of building something more complex than his Difference Engine, Babbage went on to design the Analytical Engine. Today, many people refer to it as the first automatic digital computer: it could store information to use later, solve more complex mathematical calculations and follow instructions given to it to complete a task.

Ada's Notes

After hearing Babbage talk about his new engine on a lecture tour, Luigi Menabrea, an Italian engineer, wrote an article in French about the Analytical Engine in 1842. Soon after, Charles asked Ada (who was familiar with his new engine design) to translate Menabrea's text from French to English. Tripling the size of the article by the time she finished in 1843, Ada not only translated Luigi's work but added detailed notes of her own. As part of her additions, Ada discussed the promise of the new engine; she wrote at length about all the possible things it could be used for that were not just 'number crunching', such as graphic design, interpreting symbols and composing music. Ada also included complete instructions that could be given to the engine so it could find a certain sequence of numbers called Bernoulli numbers. Her instructions are considered by many to be the first ever computer program. Over 100 years later, Alan Turing (the famous mathematician) found and read Ada's translation and it inspired his own ideas about computing. He is considered by many to be one of the founding fathers of modern computer design.

Personal Life

In 1835, Ada married the 8th Baron of Ockham, William King-Noel, when she was 19. In 1838, he became the first Earl of Lovelace. As a result, Ada became Countess of Lovelace at age 22. Together, they had three children.

Ada once said, "Imagination is the Discovering Faculty, pre-eminently. It is that which penetrates into the unseen worlds around us, the worlds of Science." Even among many modern computer experts, she is still admired for her suggestions and the ideas she imagined computers could do over a century ago.

Questions

1. In what year was Ada born? Tick one.

   - ○ 1815
   - ○ 1829
   - ○ 1835
   - ○ 1842

2. Draw **four** lines and match each event to Ada's age.

12	Ada met Charles Babbage, a fellow mathematician, at a party.
17	Ada married William King-Noel, 8th Baron of Ockham.
19	Ada designed a steam-powered flying machine.
22	Ada became the Countess of Lovelace.

3. Who initially wrote the article that Ada was asked to translate?

   _____

4. Look at the section called **Early Life**.

   Find and copy one word that means the same as 'smart' or 'clever'.

   _____

5. Fill in the missing words.

   It was meant to be an automatic and _____ calculator that could calculate and solve a variety of _____ problems.

6. If you could show Ada a modern computer game or program, what would you choose and why?

7. How do you think Ada felt when she had to spend a whole year in bed because of the measles? Explain your answer.

8. Would you like to study mathematics, logic and science with private tutors like Ada did as a child? Explain your answer.

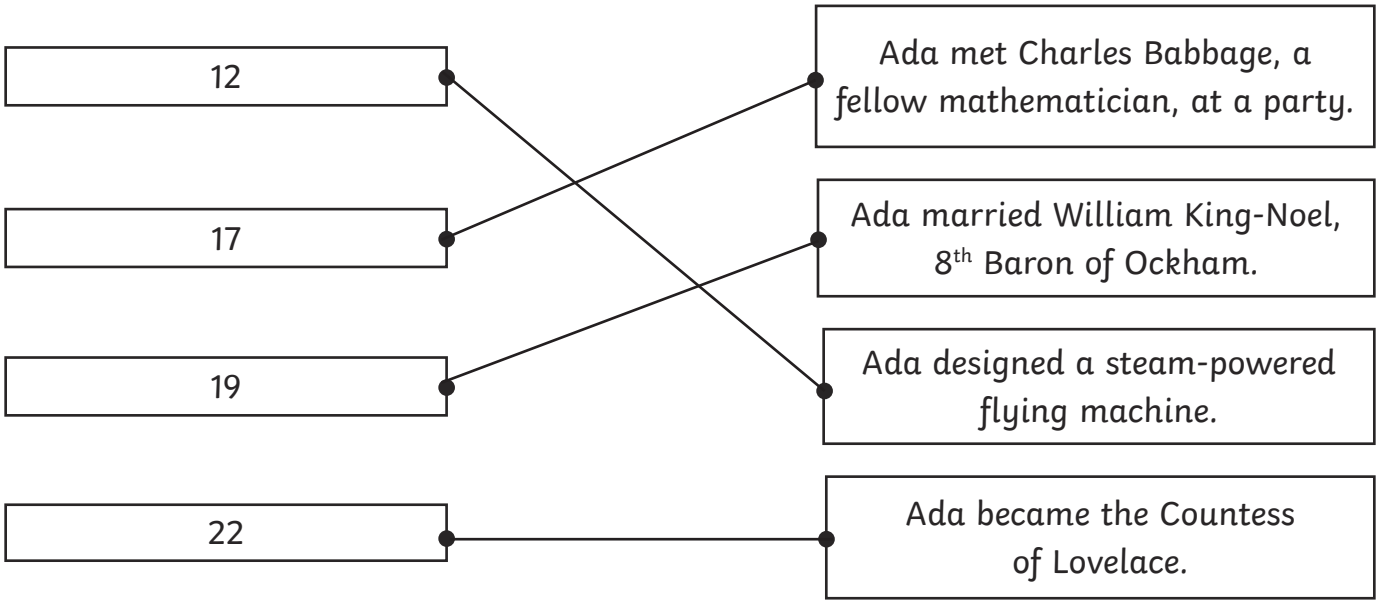
9. Do you think it is important that people know about Ada Lovelace? Explain your answer.

Answers

1. In what year was Ada born? Tick one.

   - ☑ **1815**
   - ○ 1829
   - ○ 1835
   - ○ 1842

2. Draw **four** lines and match each event to Ada's age.



3. Who initially wrote the article that Ada was asked to translate?

   Luigi Menabrea wrote the article that Ada was asked to translate.

4. Look at the section called **Early Life**.

   Find and copy one word that means the same as 'smart' or 'clever'.

   intelligent

5. Fill in the missing words.

   It was meant to be an automatic and **mechanical** calculator that could calculate and solve a variety of **mathematical** problems.

6. If you could show Ada a modern computer game or program, what would you choose and why?

   Pupils' own responses, such as: I think I would like to show her a program that creates a slideshow. It would be great to show her how the animations and graphics work and I think she would really enjoy it based on what she wrote in her translation.

7. How do you think Ada felt when she had to spend a whole year in bed because of the measles? Explain your answer.

   Pupils' own responses, such as: I think she was probably a bit bored. I think she also might have been a bit annoyed if she was still unwell and feeling ill at the time. Feeling ill for a long time can make you frustrated.

8. Would you like to study mathematics, logic and science with private tutors like Ada did as a child? Explain your answer.

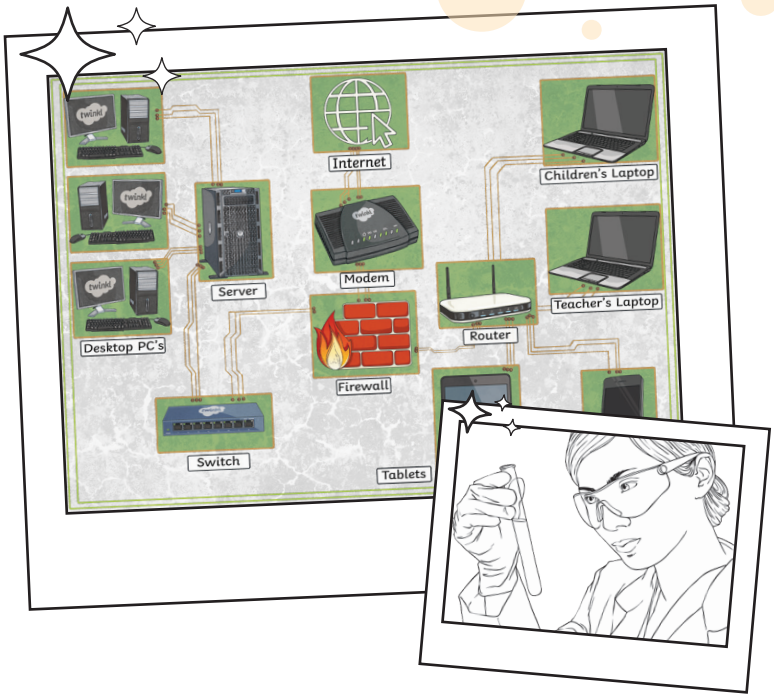
   Pupils' own responses, such as: Yes, I think I would. I think it would be great to have a teacher focused on you and teaching just you. It would mean you would always have help and they can move you on quickly if you get something easily.

9. Do you think it is important that people know about Ada Lovelace? Explain your answer.

   Pupils' own responses, such as: Yes, I think it is important to learn about Ada Lovelace because she wrote down ideas and thoughts that pretty much predicted what modern computers do today. She also wrote the first computer program.

Ada Lovelace

A Victorian mathematician and writer, Ada Lovelace is credited by many with being the first computer programmer and for writing the first computer program (otherwise known as an algorithm) designed to be carried out by a machine.

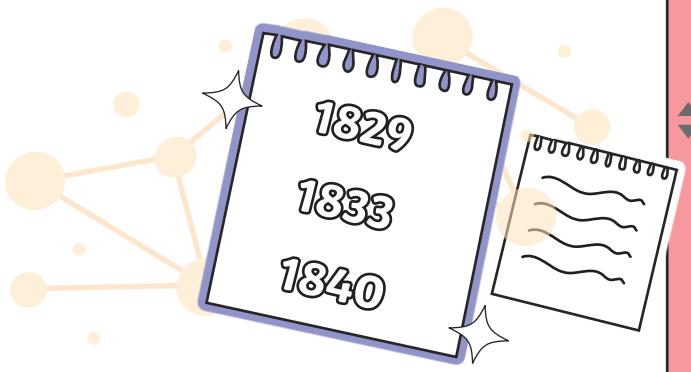


Early Life

Born on the 10th December 1815, Augusta Ada Byron was the only child of Lord Byron (a famous British poet) and his wife, Lady Anne Isabella Milbanke. Her mother was a mathematician and nicknamed 'the Princess of Parallelograms' by her husband. Lady Anne strongly encouraged Ada to study mathematics, science and logic and hired well-known tutors, such as scientist and mathematician Mary Sommerville, to instruct her. Ada was an excellent student and used her knowledge to study the diagrams of the latest Victorian inventions. Using what she learnt, she created her own designs for elaborate boats and a steam-powered flying machine by the time she was 12 years old.

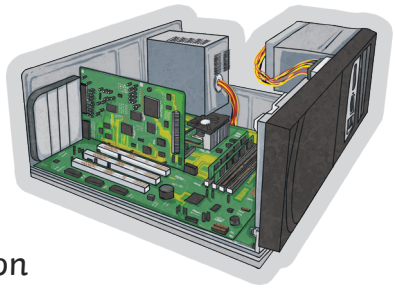
Teenage Years

As a child, Ada was often ill. She suffered from frequent headaches and ended up bedridden for a whole year in 1829 after contracting the measles when she was 13. However, she continued to study and explore the world of mathematics despite her ill health. At a party in 1833, she was introduced to a fellow British mathematician called Charles Babbage, who is often referred to as 'the Father of Computing'. He was impressed with seventeen-year-old Ada's knowledge and interest in mathematics and science and called her 'the Enchantress of Numbers'. The two began a lifelong friendship that they maintained through letters and meetings. Wanting to help her succeed, Babbage used his influence to ensure that she was able to study advanced mathematics with University of London professor, Augustus de Morgan in 1840.



Interesting Engines

During the early days of their friendship, one of Babbage and Ada's topics of conversation was a machine he had designed called the Difference Engine. Designed to operate as an automatic (something that is able to work by itself) and mechanical calculator, it could calculate and solve a variety of mathematical problems. Ada was fascinated with the portion of the Difference Engine that had been built and both visited and wrote to Babbage to discuss it and other mathematical theories.



Building on his ideas about the Difference Engine, Babbage went on to design the Analytical Engine, which many people consider the first automatic digital computer: it could store information to use later, solve more complex mathematical calculations and follow instructions given to it to complete a task.

Ada's Notes

Luigi Menabrea, an Italian engineer, wrote an article in French about the Analytical Engine in 1842. He had listened to Babbage's lectures on his new engine and discussed it with him in person. Knowing that Ada was familiar with his new design, Charles asked Ada to translate Menabrea's text into English. Ada not only translated Luigi's work but added extensive notes of her own, tripling the size of the original article! In her new version, which she finished in 1943, Ada saw the potential of the new engine; she recognised and discussed at length the possibility that it could be used for more than just 'number crunching'.

She suggested that it could also be used for graphic art and musical purposes and also included detailed instructions that could be imputed into the engine so it could calculate a certain sequence of numbers called Bernoulli numbers. Her instructions are considered by many to be the first ever computer program. During the Second World War, mathematician and computer design pioneer Alan Turing (nicknamed Prof by his colleagues) found and read Ada's translation. It inspired his ideas about computing and helped him become one of the leading forces behind modern computers and artificial intelligence.

Personal Life

When she was 19 years old, Ada married the 8th Baron of Ockham, William King-Noel. Three years later in 1838, he was raised to the rank of Earl and became the first Earl of Lovelace. As a result, Ada became Countess of Lovelace. Together, they had three children. William did not discourage his wife from continuing her mathematical studies and she was able to balance her education with her personal life.

Ada once said,

"Imagination is the Discovering Faculty, pre-eminently. It is that which penetrates into the unseen worlds around us, the worlds of Science."

Today, she is acknowledged by many for her ability to imagine and suggest what modern computers do easily today.

Questions

1. In what year did Ada meet Charles Babbage? Tick one.

   - ○ 1829
   - ○ 1833
   - ○ 1838
   - ○ 1843

2. Draw **four** lines and match each nickname to its owner.

the Father of Computing	Alan Turing
Prof	Lady Anne Isabella Milbanke
the Princess of Parallelograms	Charles Babbage
the Enchantress of Numbers	Ada Lovelace

3. How many children did Ada have?

   _____

4. Look at the section called **Early Life**.
   Find and copy one word that means the same as 'detailed' or 'intricate'.

   _____

5. Fill in the missing words.

   Ada was _____ with the portion of the Difference Engine that had been built and both visited and wrote to Babbage to discuss it and other mathematical _____.

6. "**Imagination is the Discovering Faculty, pre-eminently. It is that which penetrates into the unseen worlds around us, the worlds of Science.**"

   Do you agree with what Ada says? Explain your answer.

   _____

   _____

   _____

7. Why were Ada's notes about the Analytical Engine so important? Explain your answer.

8. How do you think Ada Lovelace's husband felt about her mathematical skills? Explain your answer.

9. How do you think Alan Turing felt when he began to read Ada's translation? Explain your answer.

10. Tick one box in each row to show whether each statement is **true** or **false**.

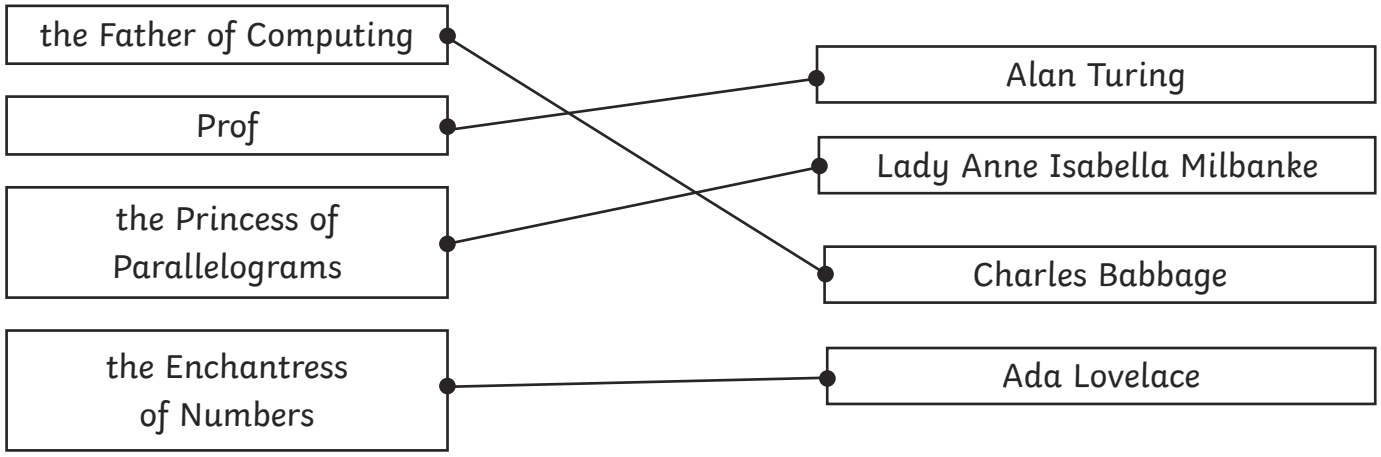
	True	**False**
Ada Lovelace's father was a famous French poet.		
Charles Babbage designed the Difference Engine.		
Ada's husband was the first Earl of Lovelace.		
Ada studied art, science and mathematics.		
Ada studied with Augustus de Morgan in 1833.		

Answers

1. In what year did Ada meet Charles Babbage? Tick one.

   ○ 1829
   ✓ **1833**
   ○ 1838
   ○ 1843

2. Draw **four** lines and match each nickname to its owner.



3. How many children did Ada have?

   Ada had three children.

4. Look at the section called **Early Life**.
   Find and copy one word that means the same as 'detailed' or 'intricate'.
   elaborate

5. Fill in the missing words.
   Ada was ***fascinated*** with the portion of the Difference Engine that had been built and both visited and wrote to Babbage to discuss it and other mathematical **theories**.

6. "**Imagination is the Discovering Faculty, pre-eminently. It is that which penetrates into the unseen worlds around us, the worlds of Science.**"

   Do you agree with what Ada says? Explain your answer.

   Pupils' own responses, such as: I agree with what Ada says. I think that we only question and investigate scientific ideas when we use our imagination. I think our imagination also helps us to picture scientific concepts that are hard to see.

7. Why were Ada's notes about the Analytical Engine so important? Explain your answer.

   Pupils' own responses, such as: I think they are important because they proposed many different ideas about what a machine like Babbage's could do. Her ideas inspired Alan Turing, who helped develop modern computers.

8. How do you think Ada Lovelace's husband felt about her mathematical skills? Explain your answer.

   Pupils' own responses, such as: I think he knew that she was smart and he respected her knowledge of mathematics. She was able to have a friendship with Charles Babbage, continue studying and write about the Analytical machine.

9. How do you think Alan Turing felt when he began to read Ada's translation? Explain your answer.

   Pupils' own responses, such as: I think Alan Turing was probably excited while reading Ada's translation. Technology had moved on by that point and it was probably easier for him to see what she was talking about and imagine it as a reality.

10. Tick one box in each row to show whether each statement is **true** or **false**.

	True	False
Ada Lovelace's father was a famous French poet.		✓
Charles Babbage designed the Difference Engine.	✓	
Ada's husband was the first Earl of Lovelace.	✓	
Ada studied art, science and mathematics.		✓
Ada studied with Augustus de Morgan in 1833.		✓