

# TEACHING CHARACTER

THROUGH THE PRIMARY CURRICULUM

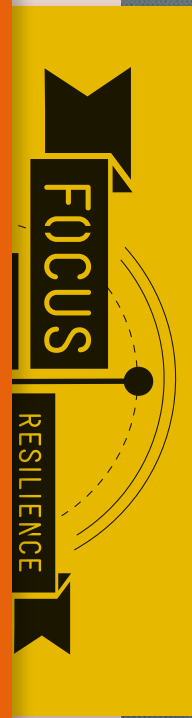
A CROSS-CURRICULA APPROACH  
TO TEACHING CHARACTER

## NUMBERS IN FOCUS

VIRTUE: FOCUS - SUBJECT: MATHS



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Postkarte

Person: Fischer

“CONCENTRATE  
ALL YOUR  
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ALEXANDER GRAHAM BELL

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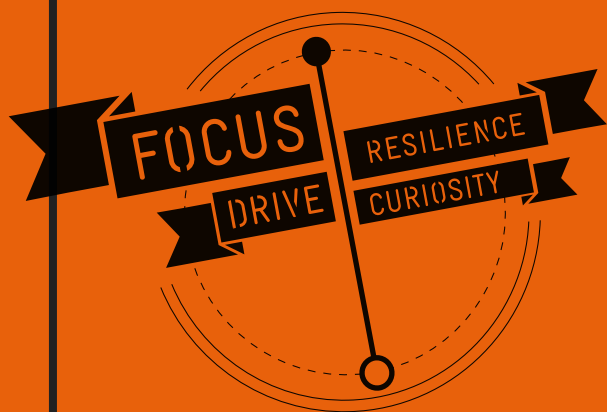
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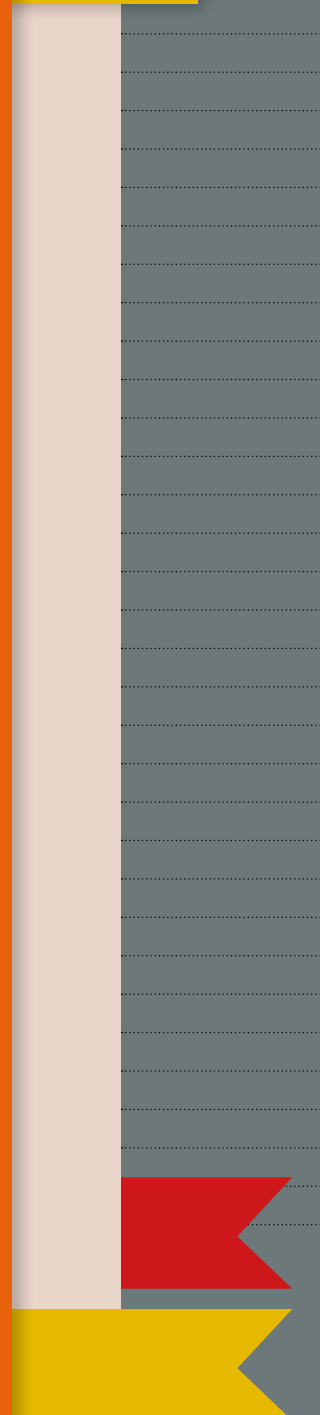
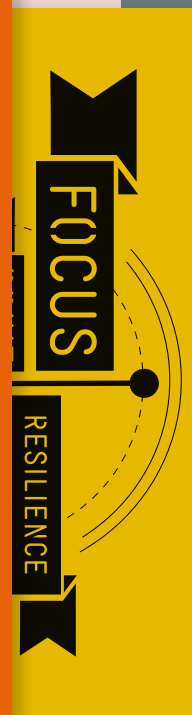
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TEACHER'S NOTES

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# TEACHING CHARACTER

## NUMBERS IN FOCUS – EMMY NOETHER



### TEACHER'S NOTES

The purpose of this pack is to reaffirm and develop pupils' knowledge and understanding of character virtues, with particular reference to the primary virtue of **focus** and the secondary virtues of resilience, drive and curiosity. These virtues should be highlighted as important to a successful transition from Year 6 (Key Stage 2 Primary) to Year 7 (Key Stage 3 Secondary). To accompany these Teacher's Notes, Numbers In Focus – Pupil Activity, Numbers In Focus Narrative and a PowerPoint are downloadable via the Jubilee Centre for Character and Virtues website.

#### THE FOLLOWING SUPPORTING DOCUMENTS ARE ALSO PROVIDED ONLINE:

- Teaching Character Through the Primary Curriculum Introduction Materials
- Pre-lesson Virtue Toolkit including activities on the following virtues: Resilience, Courage, Focus, Curiosity, Integrity, Drive, Charity and Service.
- Focus PowerPoint
- Other narratives in the programme including: John Simpson, Alan Turing, Gertrude Elion, Luz Long, Wangari Maathai, Winston Churchill and a Local Hero.

#### BACKGROUND INFORMATION FOR TEACHERS:

This information is to supplement the Focus PowerPoint, which provides an investigatory approach to focus in mathematics. The 'Numbers in Focus' Narrative is available online and can be printed off for pupil use. The 'Numbers in Focus' Narrative in this pack gives an abridged account of Emmy Noether's life and her focus in achieving new mathematical theories. The main emphasis of the narrative is to provide sufficient evidence of Noether's focus in her pursuit of mathematical breakthroughs for classroom discussion. The extract provides opportunities to discuss Noether's virtues and disposition. The aim is for this lesson to open a discussion about focus and the secondary virtues in focus (resilience, drive, curiosity). Children should be given the opportunity to reflect on their learning and how these virtues are present in their own life.

Teachers may well wish to expand and develop work here, using direct links to the Maths curriculum and cross-curricula links to English. These resources and lesson plans provide a guide and teachers are encouraged to adapt them to best suit the needs of their classroom.

#### OTHER RESOURCES

- <http://www.britannica.com/biography/Emmy-Noether> – Encyclopaedia Britannica
- [http://www.nytimes.com/2012/03/27/science/emmy-noether-the-most-significant-mathematician-youve-never-heard-of.html?\\_r=0](http://www.nytimes.com/2012/03/27/science/emmy-noether-the-most-significant-mathematician-youve-never-heard-of.html?_r=0) – New York Times article
- <http://www.thefamouspeople.com/profiles/emmy-noether-507.php> – Biography
- <https://www.washingtonpost.com/news/comic-riffs/wp/2015/03/23/emmy-noether-google-doodle-why-einstein-called-her-a-creative-mathematical-genius/> – Washington Post article

# LESSON PLAN

## NUMBERS IN FOCUS

This lesson plan, with accompanying PowerPoint, is a guide for teachers in how to best use the pupil resources provided. This plan should provide inspiration and is a suggested way to conduct a lesson to meet the objectives stated. Teachers are encouraged to adapt and develop this plan to best suit their class. The corresponding Virtue Toolkit lesson should be taught pre-lesson and the Virtue Glossary could be provided throughout the lesson to aid pupils' understanding. Teachers should use a selection of different methods and processes to facilitate discussion and reflection on the primary and secondary virtues in focus. It is important pupils become aware of the virtues and their meaning, but discussion and reflection will also aid pupils' understanding of them. Teachers may need to differentiate this lesson to best suit their pupils' needs; paired, shared, group or guided work is encouraged where needed.

TITLE: NUMBERS IN FOCUS – EMMY NOETHER  
PRIMARY VIRTUE: FOCUS

POSSIBLE CROSS-CURRICULA LINKS:  
ENGLISH – BIOGRAPHIES AND AUTOBIOGRAPHIES

CURRICULUM LINK: MATHS – ALGEBRA

### LEARNING OBJECTIVES

1. To understand what the virtue of focus means in the life of Emmy Noether.
2. To accurately identify vocabulary that illustrates the virtue of focus in the 'Numbers in Focus' Narrative.
3. To begin to be able to retrieve information from the narrative that illustrates a wider selection of virtues.

### LEARNING OUTCOMES

1. To be able to identify and describe the virtue of focus and begin to relate it to their own lives.
2. To begin to discuss how different virtues occur together in positive or negative ways.
3. To begin to be able to relate the virtue of focus to the period of transition from Year 6 to Year 7.

### RESOURCES

Provided: Numbers in Focus Narrative, Numbers in Focus Teacher's Notes, Numbers in Focus Pupil Activity, Focus PowerPoint, I Will cards.  
Not Provided: Interactive White Board, Flipchart, Pens, Paper

### INTRODUCTION

5 MINUTES

Introduce/affirm the meaning of character and virtue. Introduce the definition of Focus (see Focus PowerPoint). Go over children's examples of this virtue in their own lives.

### TEACHER LED ACTIVITY

20 MINUTES

Introduce PowerPoint and ask, can you think of a time you have shown focus? Did showing focus help you achieve your goals? Encourage discussion among children and then reflect on answers as a whole class. Move on to next slide. Show children the pictures (print pictures off if needed). Ask the children, how are these people showing focus? What might be distracting them and why? Who do you think it's most important for to stay focused? Discuss answers in pairs or small groups and then bring together for class reflection. Discuss whether having too much focus can have negative consequences, e.g. you may neglect your friends or family, you may become obsessed. Discuss what other virtues you may need to remain focused. Show last slide and give brief introduction to Emmy Noether and her links to the maths curriculum.

### CHILD LED ACTIVITY

25 MINUTES

Allow pupils time to read/or read to the pupils the 'Numbers in Focus' Narrative, instructing them to look closely for when the primary virtue is displayed (provide highlighters if appropriate). Children must also reflect on secondary virtues present in the narrative (resilience, drive, curiosity) and how these may have aided Noether in solving mathematical problems. Discuss whether these virtues are always positive. Were there any negative consequences from displaying such virtues? Ask children to then answer questions from the activity sheet. Model if necessary.

### PLENARY

10 MINUTES

Bring the group together to discuss the examples of focus found within the narrative and how these may have developed or clashed with other virtues. Invite them to share their examples. Explain how and where this virtue will be relevant for when the children transition to Year 7. Provide 'I will' cards and get the children to write a statement of intent – one thing they will now do in regards to this virtue. Make sure they are achievable.

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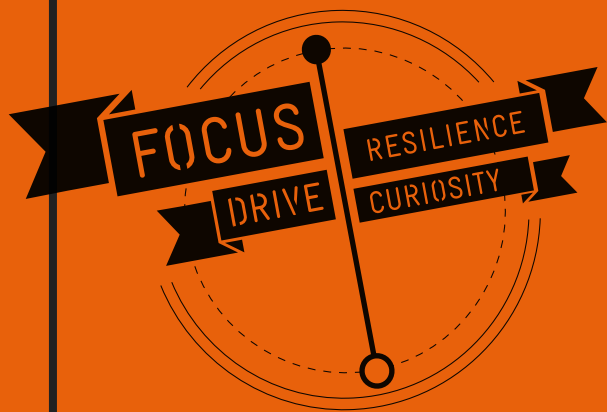
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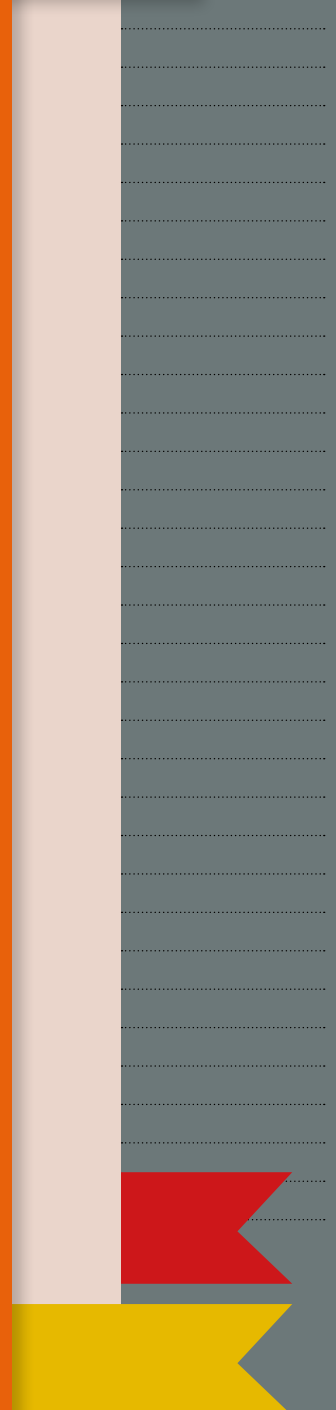
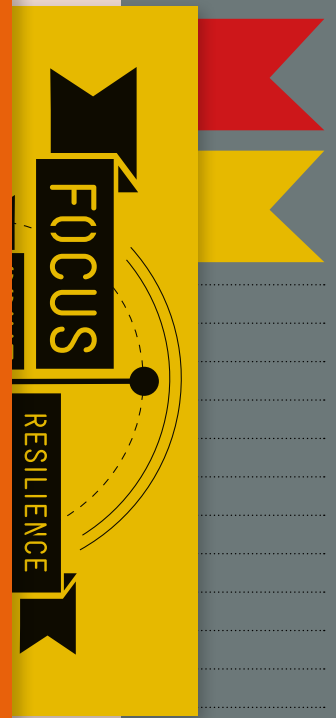
## NUMBERS IN FOCUS

MAIN NARRATIVE

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## EMMY NOETHER

Emmy Noether was a very famous mathematician. Though she spent most of her life in **obscurity**, fighting against **oppression**, her achievements are far reaching; she changed the way mathematicians think about maths. Other famous mathematicians, such as Albert Einstein, have described her as the most important woman in the history of mathematics.

Amalie Emmy Noether (known as Emmy) was born in 1882 in Germany. As a child, she was taught to cook, clean and play the piano; no different to many other young women of the time. Her father was a **professor** of maths and two of her brothers were going to university to study science. Emmy wanted to go to university too, but universities in Germany did not allow women to attend. Emmy was determined to not let this obstacle stand in her way.

The University of Erlangen allowed her to sit in the classes but she would not receive any credits for attending. She was just there to watch. After two years, she decided to take the exams, and she passed. Arguments went on at the university about whether Emmy should be allowed to attend. It was clear that she had a talent for maths, but people could not see past the fact she was female. Emmy continued to focus on her work. After five more years of studying, she was awarded a degree in mathematics, becoming only the second woman to do so.

Emmy wanted to continue her studies and wanted to learn more about mathematics. No university would employ her because she was a woman. Eventually, she went to work for her father, working for the next seven years without pay. She did **research** for him and taught some of his classes when he was ill, but still arguments raged on. Many other professors thought a university was not a place for a woman, regardless of how intelligent she was. Emmy spent these seven years trying to ignore these people. She refused to get involved. She wanted to concentrate on maths and maths only.

By the end of World War I things had changed in Germany. Women had been given the right to vote and were beginning to get jobs they couldn't have had before. Emmy got a job working at a university, on very little pay, and went on to work with some of the greatest mathematicians in Germany. When Einstein released his '**Theory of Relativity**', it transformed Emmy's thinking. She immediately began to make many breakthroughs in her studies and her findings were **astounding** everyone she worked with. The professors she worked closely with knew how important the work she was doing was and fought for her to be treated equally at the university. Emmy continued to **refrain** from being involved in the debate and concentrated solely on her maths and the teaching she was now doing. Even the protests from her fellow professors could not change the opinions of the people running the university.



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- ALEXANDER GRAHAM BELL

Emmy had produced some of the greatest breakthroughs in the study of maths ever known and had helped form her own **theory** (Noether's Theorem), but things began to get much harder for Emmy. In 1933, the Nazi Party came to power in Germany. Hitler was preparing Germany for a second world war. Emmy, who was both female and Jewish, had made it public that she was against another war. The Nazi Party did not like this. Under the new government, women and Jews were not allowed to teach at universities, nor hold influential jobs. Initially Emmy tried to ignore this and she continued to focus on her maths and teaching, but eventually she was sacked from her job. Other professors tried to find her another university to work at, outside of Germany. Somewhere her talent would be appreciated. She was offered jobs in Russia, but she decided to work in America, after Albert Einstein had helped find her a job.

Emmy left her native Germany and began teaching in the USA. She began teaching at an all-female college where she was focused on **ensuring** that students were given the opportunities she had not. Her style of teaching was often described as uplifting and, even through all the obstacles she had faced, she never lost her sense of humour. Despite all the distractions in her life, she was able to inspire her students to make a difference in the world.

'NOETHER WAS THE MOST SIGNIFICANT CREATIVE MATHEMATICAL GENIUS THUS FAR PRODUCED SINCE THE HIGHER EDUCATION OF WOMEN BEGAN.'

- ALBERT EINSTEIN

Emmy died suddenly in 1935. She had dedicated her life to the **advancement** of mathematics. She had never married and she did not care for possessions or money. After her death, Einstein called her the most "significant" and "creative" female mathematician of all time. Even today, many people do not know her name or cannot recall what she did, but Emmy Noether's constant focus helped her overcome many obstacles. She became one of the most important mathematicians the world has known and her influence is still felt today.

GLOSSARY

- ADVANCEMENT**  
to develop and improve something
- ASTOUNDING**  
surprisingly impressive
- ENSURING**  
to make certain of something
- OBSCURITY**  
being unknown
- OPPRESSION**  
prolonged cruel or unjust treatment
- PROFESSOR**  
A high level university teacher
- RESEARCH**  
to investigate something
- REFRAIN**  
to stop oneself from doing something
- THEORY**  
a set of ideas that something is based on
- THEORY OF RELATIVITY**  
a famous theory about space and time by Albert Einstein



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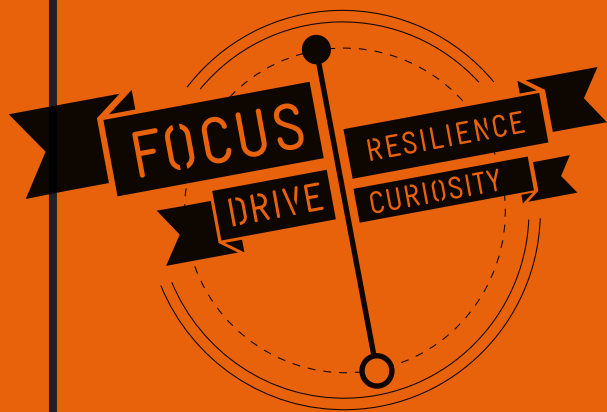
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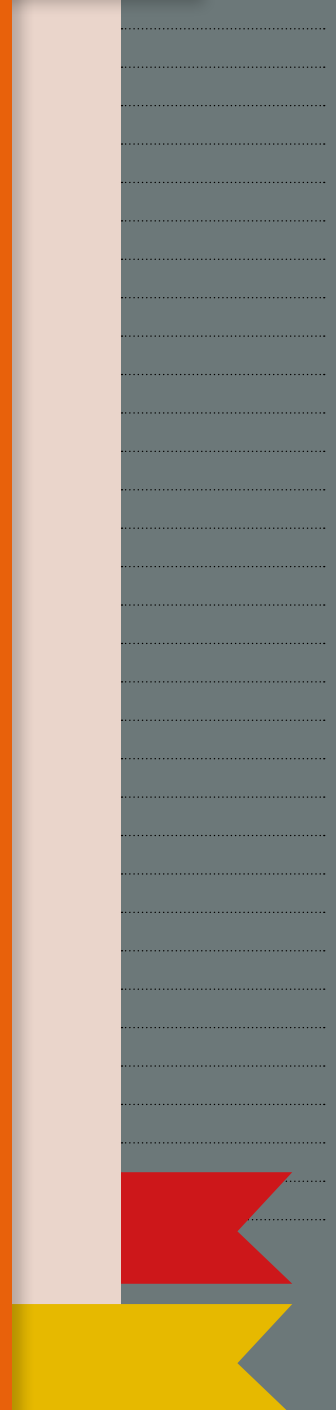
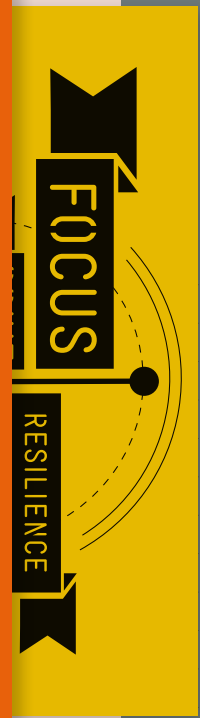
## NUMBERS IN FOCUS

RESOURCES FOR PUPILS

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Read the 'Numbers in Focus' narrative and answer these questions.



Write down an occasion where Emmy Noether showed focus.



Do you think that showing too much focus could have had negative consequences for Emmy Noether? What could these have been?



What other virtues did Emmy Noether need to become a successful mathematician?



Which of these virtues do you think was the most important? Explain your answer.



Imagine you were Emmy Noether. Write a letter to Albert Einstein thanking him for his help and support.

